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New Technological Applications for Foreign and Second Language Learning and Teaching

Mariusz Kruk and Mark Peterson

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New Technological Applications for Foreign and Second Language Learning and Teaching

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This chapter shows readers the importance and application of pattern matching in learning languages; specifically, the application of natural language processing to address specific problems of Japanese learners of English at a public university. The chapter introduces the concepts of patterns, detection, and detection methods. The author turns to the pedagogic application of pattern matching, first discussing the relevant theory, then describing hacks developed by language teachers and learners. The final section describes and evaluates iCALL tools developed at the University of Aizu, including a mobile app and the Pronunciation Scaffolder, a real-time presentation script annotator.

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Virtual reality (VR) offers unique opportunities for immersive activities previously not possible in the language classroom. However, as with any new instructional medium, it is difficult to employ these technologies effectively. There is often a gap between teachers' understanding of how to use the technology and the pedagogical needs of the classroom. This chapter introduces the VR Application Analysis Framework. The framework, supported by established theory, assists with the analysis and implementation of commercial off-the-shelf VR applications into language classroom tasks. This chapter explores the history of VR and the background for its potential use in the classroom. The four key aspects of the framework are presented: immersive capacity, cognitive load, purpose, and communicative capability. Four existing VR applications and their accompanying activities are presented as examples of using the framework.

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This chapter reviews some of the most common research approaches used in investigating language learning and teaching in virtual worlds. In particular, the author makes the case for qualitative research approaches to the investigation of language learning and teaching in virtual worlds. The highly representational and immersive nature of online environments such as virtual worlds demands that researchers pay specific attention to the quality of teacher and learner experience and to individual reactions to the visual and kinesthetic stimuli of the environment. The chapter discusses some of the advantages of qualitative practitioner research in relation to the specific nature of virtual world contexts for language learning.

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The use of digital games represents an expanding domain in computer-assisted language learning (CALL) research. This chapter reviews the findings of 26 learner-based studies in this area that are informed by cognitive and social accounts of SLA. The analysis shows that massively multiplayer online role-playing games (MMORPGs) are the most frequently investigated game type and the majority of studies involved EFL learners in higher education. Mixed methods were the most frequent research tool utilized by researchers. Limitations of current research include the preponderance of small-scale experimental studies that investigated only a limited number of factors. Although the research is not conclusive, findings indicate that game play facilitates collaboration, the production of target language output, vocabulary learning, and reduces the influence of factors that inhibit learning. This chapter concludes by identifying promising areas for future research.

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This chapter explores gamification as an innovative pedagogical strategy in language learning with the use of technology. The authors examine the construct of gamification, arguing for the need of a clear definition as many authors use various terms interchangeably. The dynamics, mechanics, and components to conform a gamified learning experience are presented. The chapter describes current research and teaching experiences on gamification and technology-enhanced teaching and learning. Two approaches are identified: the use or design of gamified apps and gamified learning experiences designed entirely by teachers and implemented with the help of different technologies. Some tools and platforms for gamification are discussed and recommendations on how to implement a successful gamified teaching intervention are provided. Two approaches to researching gamification are also proposed.

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This chapter reports on a study that examines learners' beliefs towards technology use with specific focus on the development of learner autonomy in a blended context within a post-secondary English for academic purposes (EAP) program. The growth of post-secondary EAP programs along with the researchers' awareness and interest in leveraging technological tools in support of student-centered learning motivated this research. Findings reveal students' overall positive attitude towards technology use and adoption of some 21st century skills in learning English. When innovative pedagogical methods are supported by intervention in learning, a heightened critical awareness and movement towards learner autonomy was observed among students through fostering of some 21st century competencies. The chapter concludes with recommendations for teacher education in tech-enhanced pedagogy, teacher-intervention in educating students about the rationale for technology use, leveraging students' digital resources and ongoing critical and reflective teaching practices.

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This chapter explores the use of a flipped learning approach through the application Instagram in an English as Foreign Language (EFL) class. A case study involving 53 participants at a high school is presented. A mixed methods approach using quantitative and qualitative information is carried out where 4 different data collection instruments collected information about students' perceptions of the flipped learning model as well as the use of Instagram. Findings emphasized the app and the flipped learning methodology as motivational and useful elements to develop language learning processes. However, learner feedback indicated that the flipped learning model used in this research was not viewed as superior to traditional lecture-based instruction. This chapter concludes with a discussion of the implications of implementing flipped learning models that utilize mobile devices in EFL education.

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Seyit Ahmet Çapan, Harran University, Turkey

Digital storytelling (DST) is an innovative outgrowth of traditional learning/teaching through stories and has gained vast popularity in language classrooms thanks to findings indicating positive impacts on the four major skills. This chapter investigates the influence of DST (i.e., the independent variable) on English as a foreign language (L2) learners' writing anxiety and attitudes (i.e., the dependent variables). Moreover, it examines if engagement in DST affected L2 writing errors. This chapter reports on the findings of a quasi-experimental study that elicited quantitative and qualitative data collected from pre- and post-study questionnaires and learner-created stories. The discussion documents that DST compared to traditional print-based stories reduced L2 writing anxiety while it fostered positive attitudes towards L2 writing. Analysis revealed fewer errors in stories written by a DST group compared to a comparison group over the course of the study period. Accordingly, this chapter proposes practical applications for the integration of DST into L2 writing classes.

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Juan Francisco Coll-García, Universitat Jaume I, Castelló, Spain

This chapter investigates student perceptions toward an international collaboration that involved an online role-play simulation, Engineers Without Borders (EWB). Forty-two undergraduate students enrolled in an engineering course at a university in the United States were paired with 56 engineering students based at a university in Spain. The simulation was designed and developed not only to foster problem-solving skills, but also to provide opportunities for participants to develop communication skills, teamwork, and professionalism. The simulation also provided opportunities for EFL students to communicate in English and develop their intercultural skills through the use of a variety of electronic collaboration tools. This chapter reports on participant feedback and highlights the benefits of the computer-based nature of the telecollaboration.

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Hiroshi Hasegawa, Curtin University, Australia
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This chapter explores the effectiveness of computerised oral testing on Japanese learners' test experiences and associated affective factors in a Japanese program at the Australian tertiary level. The study investigates (1) Japanese beginners' attitudes towards the feasibility of utilising a computer-generated program vs. a tutor-fronted oral interview to assess their oral proficiency, and (2) the challenges and implications of computerised oral testing vis-à-vis Japanese beginners. It presents the initial findings of the qualitatively analysed data collected from student responses to open-ended survey questions and follow-up semi-structured interviews. A thematic analysis approach was employed to examine student perceptions of the two different test settings and their effects on students' oral performance in relation to test anxiety. Despite the fact that computerised oral testing was overall perceived to be beneficial for streamlining the test process and reducing learners' test anxiety, the findings also identified its limitations.

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This chapter explores university students' views of Replika, an English chatbot. Students in a department of health administration at a state university in Turkey used Replika to complete different tasks over 7 weeks. At the end of the study, semi-structured interviews were conducted with 10 randomly selected students. They liked using Replika and found the software useful. The participants underscored the importance of receiving an immediate response to what they wrote on their mobile devices and added that they edited their sentences when Replika could not understand the message they were trying to convey.

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Volker Hegelheimer, Iowa State University, USA

Technology-enhance language learning (TELL) continues to grow in use within language classrooms. However, a number of hurdles still remain when it comes to the effective integration of technology for skill-specific language learning, such as a lack of training and an overabundance of tools to choose from. This chapter identifies and describes three major hurdles that still plague effective TELL practices. Authors describe 2 current efforts to overcome these hurdles: a Global Online Course (GOC) on effective educational technology integration, and a year-long comparative case study on the GOC that explores the trainees' perceptions of educational technology. The chapter presents potential avenues for overcoming the above hurdles based on insights gained from four teachers of the GOC, as well as the trainees' perceptions and integration of educational technology in the language classroom.

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Lina Lee, University of New Hampshire, USA

The chapter reports a Spanish-American intercultural exchange through which L2 learners used asynchronous video discussions to exchange cross-cultural perspectives. The study involved 37 university students who carried out CMC tasks over a 14-week period. Using quantitative and qualitative data collection, the study explored the affordances and challenges of using asynchronous video discussions for intercultural learning. Findings revealed that students demonstrated interpersonal communication skills and strategies to interact with their distant partners, and gained intercultural competence. The study suggests that a personal commitment to the online exchange is essential to maximize the potential of asynchronous CMC to promote active interaction. The study concludes with pedagogical implications for practitioners interested in implementing virtual exchange projects using video discussions to develop learners' interpersonal and intercultural communicative competence.

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Integrating corpus consultation to help students' re-use of vocabulary items for essay-drafting has not been sufficiently examined in instructional contexts. This chapter investigated the linguistic features of target words for which students consulted concordance programs to include in essays by documenting the DDL of three groups of EFL students in a Taiwanese college writing program. Participant essays, video files of consultation processes, responses to questionnaires, interviews, and written records of corpus consultation were examined. Researchers found 88.14% of all consulted words were incorporated into essays, with learners looking up 3.18 words. The lexical profile of consulted words indicates that learners mainly used the most common 1,000 to 2,000 words with more verbs more frequently consulted than nouns. Students queried words for confirmation or incorporated the discovered vocabulary into essays. As emergent pattern hunters, the participants made only limited use of dictionaries and bilingual resources. Implications of the findings are discussed.

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Nina Vyatkina, University of Kansas, USA

Data-Driven Learning (DDL), or a corpus-based method of language teaching and learning, has been developing rapidly since the turn of the century and has been shown to be effective and efficient. Nevertheless, DDL is still not widely used in regular classrooms for a number of reasons. One of them is that few workable pedagogical frameworks have been suggested for integrating DDL into language courses and curricula. This chapter describes an exemplar of a practical application of such a pedagogical framework to a high-intermediate university-level German as a foreign language course with a significant DDL component. The Design-Based Research approach is used as the main methodological framework. The chapter concludes with a discussion of wider pedagogical implications.

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Preface

In a crowded room of a local shopping center a small child approaches a large window and tries to swipe it with her tiny finger! “This picture doesn’t change, why?” she asks her mother . . .. Today’s world is changing and it will continue to change. Although the world we all live in is not a virtual one and we cannot change what is in front of us as if by swiping screens on our smartphones or tablets, the use of digital technologies has become part and parcel of our private and professional lives. The prevalence of new technologies in education in general has been facilitated or even instigated by the process of innovation in methodology in teaching and learning. Nowadays it is hard to imagine a good language teacher without knowledge of new technologies and the skills for implementing them in his or her teaching practice. This is also because contemporary language learners are more willing to be taught by means of the newest digital technologies since they are increasingly becoming more digitally inclined and computer-savvy. Their digital way of living has become the modern-day learners’ way of thinking, communicating and studying, including learning a foreign/second language.

The advantages of incorporating digital technologies in language instruction are multifaceted. They include, for example, flexible, customized and self-paced environments. These enhance students’ engagement, improve critical analysis and reflection, encourage the social construction of knowledge, creation of virtual collaborative learning spaces, efficiency in managing contents and communication (Leone, 2008). In addition, the use of digital technologies promotes learner autonomy and improves language skills (Krajka, 2007; Pawlak & Kruk, 2012). It should be noted, however, that the field of computer-assisted language learning “is filled with areas that are unknown and in need of exploration” and that it is “constantly undergoing change because of technological innovation that creates opportunities to revisit old findings, to conduct new research and to challenge established beliefs about the ways in which teaching and learning can be carried out both with and without a human teacher” (Beatty, 2013, p. 1).

In view of the above, *New technological applications for foreign and second language learning and teaching* offers a wide-ranging exploration of the latest advances in technology-enhanced language learning. The topics examined include outcomes of the use of contemporary digital technologies for learners and teachers, as well as the application of recent technological developments to language learning and teaching. Further areas of investigation include the description and discussion of practical exemplars of the above phenomena in a range of language learning settings.

New technological applications for foreign and second language learning and teaching is divided into two sections. The first section, “Theoretical considerations,” contains five chapters and the second section, “Practical applications,” includes 10. A brief description of each of the chapters follows.

The first section begins with the chapter “Intelligent CALL: Using pattern matching to learn English” by John Blake which focuses on the importance and application of pattern recognition in learning languages and, in particular, on the application of natural language processing to assist Japanese EFL learners at a public university. First, the author briefly reviews the beginnings of computer assisted language learning (CALL) and the transition to intelligent CALL (iCALL). Then he discusses the concept of discovery learning and describes the pedagogic application of pattern matching. This is followed by the description and evaluations of two iCALL tools (WordBricks and the Pronunciation Scaffolder) that were developed specifically for learning English. At the end of this chapter, Blake discusses future research directions and points out the increasing importance of deep learning in iCALL.

In the second chapter ("Pedagogical considerations for successful implementation of virtual reality in the language classroom"), Ryan Lege, Euan Bonner, Erin Frazier and Luann Pascucci discuss unique opportunities for immersive activities in the language classroom offered by virtual reality (VR). They introduce a VR application analysis framework whose purpose is to guide language teachers through the implementation of commercial off-the-shelf VR applications into language classroom activities. This chapter begins with a brief discussion of the history of VR and related literature. Then the authors present four key aspects of the framework in question, that is, immersive capacity, cognitive load, purpose and communicative capability. This is followed by a presentation of how the framework may be used based on four VR applications (Spotlight Stories, Anne Frank House VR, REC Room and Tilt Brush) and example activities.

In the third chapter ("The case for qualitative research into language learning in virtual worlds"), Luisa Panichi offers a comprehensive review of some of the most popular research approaches adopted by researchers when investigating language learning and teaching in virtual worlds. The researcher argues for the use of qualitative research methods and urges researchers to acknowledge both the quality of teacher and learner experience and individual reactions to the visual and kinesthetic stimuli of these online environments. In addition, Panichi discusses benefits of qualitative practitioner research with regard to the specific nature of virtual world contexts for learning languages.

The fourth chapter ("A review of research on the application of digital games in foreign language education"), by Mark Peterson, Jeremy White, Maryam Sadat Mirzaei and Qiao Wang provides a systematic review of 26 learner-based studies published in English related to the use of digital games in CALL. The analysis of this set of studies conducted by the researchers revealed that the most commonly examined game type is massively multiplayer online role-playing games, the bulk of studies comprised EFL leaners in higher education and researchers most often employed mixed methods in their investigations. In addition, the above authors found that game play aids collaboration, language production, the learning of the target language vocabulary and limits factors that impede learning.

Finally, the last chapter in the first section ("Gamification for technology-enhanced language teaching and learning") by Joan-Tomàs Pujolà and Christine Appel, explores gamification as an innovative pedagogical strategy in learning a foreign/second language by means of technology. The researchers argue for a clarification of terms and concepts. They discuss elements of gamification (i.e., dynamics, mechanics and components) and provide a description of research on gamification and teaching experiences. In addition, the authors offer information on the available resources and technologies that can be utilized by language teachers in conducting lessons. The chapter closes with a set of recommendations on how to implement gamification in language instruction and discusses future research directions.

The second section starts with the chapter titled "Investigating learner autonomy and 21st century skills in blended tech-enhanced language learning" authored by Farhana Ahmed. The author presents the results of a study that investigated reflections, perceptions and beliefs toward the use of technology held by a group of 16 students attending a post-secondary English for academic purposes program. The researcher reports overall positive attitudes toward the use of technology, improved critical awareness and increased autonomy.

In the second chapter in this section (“Foreign language learning through Instagram: A flipped learning approach”), Alberto Andujar and Fidel Çakmak explore the use of a blended learning model through the application of Instagram among 53 high school language learners. While, on the one hand, quantitative and qualitative analysis of the data revealed the participants’ positive perceptions of the flipped learning model and the use of Instagram, they also showed, on the other hand, that the learners did not feel they made any improvement in their linguistic competence and language skills in comparison with traditional lecture-based instruction.

In the chapter titled “Using digital storytelling to handle second language writing anxiety and attitudes: A longitudinal experiment,” Seyit Ahmet Çapan reports on the results of a quasi-experimental study which investigated the impact of digital storytelling on a group of students’ L2 writing anxiety and attitudes as well as their writing errors. The results obtained demonstrated that when compared to traditional storytelling the use of digital storytelling reduced the participants’ writing anxiety, fostered positive attitudes toward L2 writing and resulted in fewer errors. The chapter closes with some practical applications for the effective integration of digital storytelling into L2 writing classes.

In his chapter titled “Students’ perceptions toward an international telecollaboration project through an engineering-themed online simulation in a language-learning setting,” Juan Francisco Coll-García reports on a study which comprised two groups of engineering students from the U.S.A. and Spain. The participants took part in a simulation that was designed to offer opportunities to communicate in English and improve intercultural skills by means of a range of electronic collaboration tools. This chapter gives an account of the subjects’ feedback and highlights the advantages of the computer-based nature of telecollaboration.

In the following chapter titled “First-year Japanese learners’ perceptions of computerised versus face-to-face oral testing: Challenges and implications,” Hiroshi Hasegawa, Julian Chen, and Teagan Collopy present the results of a study whose aim was to explore the usefulness of computerised oral testing on Japanese learners’ test experience and related affective factors. The findings demonstrated that, in general, computerised oral testing was perceived to be helpful for streamlining the testing process and lowered participants’ test anxiety; however, they also identified some limitations (e.g., the lack of nonverbal cues).

In chapter 11, “Using a chatbot, Replika, to practice writing through conversations in L2 English: A case study,” authored by Ferit Kılıçkaya, the researcher explores feedback reported by 30 second-year university students in a department of health administration at a state university in Turkey regarding their experience with Replika, an English chatbot. Analysis of the data revealed that the subjects expressed positive attitudes towards using the software in question, and that they appreciated the immediate feedback and were able to edit their sentences when the chatbot could not comprehend the message they were trying to convey.

In “Considerations for future technology development based on EFL teachers’ integration of technology” (chapter 12), Tim Kochem, Ananda Astrini Muhammad, Yasin Karatay, Haeyun Jin and Volker Hegelheimer focus on future directions for technology-enhanced language learning by reporting on a global online course and a year-long comparative case study in which naturalistic inquiry on the same course was used to uncover participant perceptions toward the use of educational technology in the language classroom.

Chapter 13 (“Promoting interpersonal and intercultural communication with Flipgrid: Design, implementation and outcomes”) authored by Lina Lee, explores a Spanish-American intercultural exchange through which 37 university students utilized asynchronous video discussions to exchange cross-cultural perspectives. The results of the study reveal that the participants showed interpersonal communication skills and strategies as well as developed intercultural competence. According to the researcher, a personal commitment to the online exchange is vital to boost the potential of asynchronous CMC to foster active interaction. The chapter offers pedagogical guidance for practitioners interested in applying virtual exchange projects utilizing video discussions to assist the development of interpersonal and intercultural communicative competence.

The last two chapters are devoted to the use of corpus-based methods in language learning instruction. Hsien-Chin Liou and Tzu-Wei Yang in their chapter titled "Data driven learning at the English drafting stage" report on an action research study whose purpose was to investigate the application of data-driven learning to discover vocabulary for essay-drafting by 49 Taiwanese EFL college students. The final chapter titled, "Corpus-informed pedagogy in a language course: Design, implementation, and evaluation," authored by Nina Vyatkina, describes an exemplar of a practical application of a pedagogy-based model for the design, implementation and evaluation of a high-intermediate university-level German as a Foreign language course with a significant data-driven learning component.

Because of its scope, the diversity of topics covered and the adoption of various theoretical perspectives, this volume is of interest not only to theorists and researchers but also to methodologists, practitioners and materials-developers and can be used in courses for undergraduate and graduate students. In addition, this book is geared toward those who wish to enhance language education by means of current technologies.

New technological applications for foreign and second language learning and teaching offers insights into state-of-the-art technological and methodological innovations and also new practical applications. Moreover, this monograph combines theoretical and applied research from an interdisciplinary viewpoint as it encompasses contributions from international experts in the field who possess extensive experience in the use of the latest technologies to enhance the process of foreign/second language learning. Finally, this volume explores how the latest technologies have the potential to engage foreign/second language learners both within and outside the language classroom and to facilitate language learning and teaching in the target language by means of them.

The editors would also like to take this opportunity to thank all contributors for their outstanding work and the army of reviewers who freely dedicated their time to ensuring that the chapters selected for this volume represent cutting edge research and also reflect some of the most innovative and rigorous scholarship in the field.

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Section 1

Theoretical Considerations

Chapter 1

Intelligent CALL:

Using Pattern Matching to Learn English

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ABSTRACT

This chapter shows readers the importance and application of pattern matching in learning languages; specifically, the application of natural language processing to address specific problems of Japanese learners of English at a public university. The chapter introduces the concepts of patterns, detection, and detection methods. The author turns to the pedagogic application of pattern matching, first discussing the relevant theory, then describing hacks developed by language teachers and learners. The final section describes and evaluates iCALL tools developed at the University of Aizu, including a mobile app and the Pronunciation Scaffolder, a real-time presentation script annotator.

INTRODUCTION

Patterns permeate every aspect of life (Carbone, Gronov, & Prusinkiewicz, 2004) from predicting weather based on cloud formations to distinguishing friends from foe based on behaviour patterns. Some of these patterns are learnt simply through exposure, but others may involve various combinations of intuition and experience. Pattern recognition is also a key tenet in language learning and has been the focus of scholarly articles for many years. In fact, almost a century ago, Sapir (1925) published an article focusing on sound patterns. Actively assisting language learners to notice and use patterns is thought to help learners master a new language more effectively and more efficiently (Ellis, 1994). More recently, Hunston and Francis (2000) coined the term pattern grammar to describe the contextual usage patterns associated with particular word senses.

Most children begin learning their first language through extensive listening (Asher, 1972). During the receptive phase when children listen but are unable to speak, language patterns in the various interrelated language systems (e.g., phonemes, morphemes, lexis and grammar) are thought to be acquired. Second language learning may differ from first language learning depending on various factors, such

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as the type of tuition, purpose of learning, relationship between mother tongue and second language, and the age of the learner (Cook, 2016; Johnson, 2017). For example, adult learners already literate in their mother tongue may first focus on reading a second language and start identifying visual language patterns before audio language patterns. Learners of a second language with the same script as their first language are more able to draw on their existing knowledge of orthographic patterns. Lexis in languages that are linguistically close share more in common than lexis in language that are linguistically distant. The greater the linguistic distance, the greater the difficulty to learn the second or additional language (Piske, MacKay, & Flege, 2001).

This chapter aims to show readers the importance and application of pattern recognition in learning languages; specifically, it focuses on the application of natural language processing to assist Japanese learners of English at a public university. These learners studied English for at least six years before entering university and study for four more years during their university program. English language learning was a compulsory school subject from the first year of junior high school when students are approximately thirteen years old. The vast majority have extensive passive vocabularies, general knowledge of many grammatical forms, and detailed knowledge of some obscure grammatical oddities that are often tested on university entrance exams. Despite their extensive knowledge of rules and words, few Japanese university students can converse freely in English. King (2013), having observed thirty English language classes in multiple Japanese universities concluded that there was “a robust trend, with minimal variation, toward silence” (p. 337).

This chapter begins by reviewing the origins of computer assisted language learning (CALL) and the transition to intelligent CALL. This is followed by a discussion of patterns in language and pattern detection. The chapter then introduces the concept of discovery learning and describes the pedagogic application of pattern matching. Pattern matching and detection tools that were developed specifically for learning English are then introduced. Specifically, two iCALL tools, both of which were developed at the University of Aizu are discussed in depth. The first iCALL tool is a mobile app called WordBricks and the second, the Pronunciation Scaffolder, a real-time presentation script annotator. WordBricks (Purgina, Mozgovoy, & Blake, 2019) was designed to help language learners acquire knowledge of syntactical patterns through a gamified environment in which users attempt to piece together jigsaw-like texts. The second tool is the Pronunciation Scaffolder (Blake, 2019) that targets learners of English who can read and understand texts but have difficulty in reading aloud. It was designed to help Japanese learners more easily read prepared presentation scripts using colour, size and symbols to visualize various pronunciation features. The chapter concludes by discussing future research directions and noting the increasing importance of deep learning in iCALL.

The main objectives of this chapter are to:

- introduce the general field of computer-assisted language learning (CALL),
- situate intelligent computer-assisted language learning (iCALL) within the CALL paradigm,
- define patterns by distinguishing between randomness, repetition and patterns,
- describe, explain and exemplify patterns in language,
- show how iCALL tools enhance discovery learning through pedagogic pattern matching,
- describe and evaluate two iCALL tools.

BACKGROUND OF CALL

CALL originated in the 1960s and 1970s in the days of microcomputers. Early innovators had to overcome significant resistance from teachers at the chalkface. The resistance was based on various misconceptions and fears (Roberts, 1993), including the fear of being replaced by a computer. This fear of technology threating jobs is not new. English workers in the textile industry in the early 19th century known as the Luddites vehemently opposed the introduction of machines and fell victim to technological unemployment.

In the pre-CALL days, the main technology used in language learning was the audio cassette. Well-resourced schools often had a dedicated language lab where students could access audio materials. The popularity of the audio-lingual method in the 1960s and 1970s led to a rapid increase in the number of language labs. Language labs nowadays tend to be multimedia labs in which students can access audio-visual media locally and via the internet. In the 80s and 1990s, audio and video cassette players were the technology that most classroom teachers of English as a foreign language (EFL) tended to use on a daily basis. In one of the early CALL books, (Kenning & Kenning, 1983) described how to write simple programs in BASIC. The perceived necessity to learn a programming language was a barrier than many language teachers did not attempt to overcome.

In a practical resource book for EFL teachers, Dudeney (2000) describes how to use the internet as a language learning resource. With ubiquitous access to the internet in many developed countries, there is a rapid trend to using online resources. Nowadays, language learners in Japanese universities often consult dictionaries and other language resources on their own web-enabled devices instead of asking their teachers. Teachers who used to display materials to classes by writing on whiteboards may now present materials using slideshow software, such as PowerPoint. This move helped classroom teachers realize how technology could increase the efficiency of classroom teaching. As laptop computers became more affordable and language learning websites became more user-friendly, CALL moved into the mainstream.

The prevalence of smartphones among learners has caused a shift away from accessing the internet via a computer. Almost all university students in Japan possess a smartphone (Tateno et al., 2019). This transition to online learning using handheld devices enables learners to access the same kinds of functionalities and opportunities previously only available to computer users. CALL is, therefore, no longer technically accurate. A new term mobile assisted language learning (MALL) appeared to catch this new technological and pedagogic development (for more details on CALL and MALL see Figueroa, 2020). Yet, as Microsoft and others began to develop platforms that work on different platforms, the boundary between mobile and computer interfaces is less distinct. Windows 10, for example, is designed to work with touchscreen devices in any orientation (portrait or landscape) and on any viewport size (e.g., mobile, tablet, laptop or monitor). Technology-enhanced language learning is perhaps a suitable catch-all term that does not limit its usage to one type of device.

The affordability and ubiquitous nature of smartphones in many countries has resulted in schools adopting bring-your-own-device (BYOD) classrooms, in which students learn on their preferred web-enabled device. This reduces the reliance on institutions to provide devices, but raises the issue of ensuring compatibility across the various platforms. Song and Kong (2017) provide a succinct description of the affordances and constraints of BYOD on pedagogic practices. Technical troubleshooting tends to be left to students themselves who solve connection, access and software problems on their own devices.

Intelligent CALL

The harnessing of natural language processing (NLP) to help language learners has taken CALL to a new level, in which systems appear to make intelligent decisions. This use of NLP in CALL is termed intelligent CALL (iCALL) (Finkbeiner & Knierim, 2008). Arguments in support of the use of artificial intelligence in CALL have been made since the 1980s. Bailin first published on using artificial intelligence in CALL in 1988, and later created a bibliography of iCALL (Bailin et al., 1989). To help create a shared understanding of iCALL, Oxford (1993, as cited in Levy, 1997, p. 220) enumerated nine principles for an Intelligent CALL (iCALL) framework to ensure that the focus of developers and practitioners was firmly on language, learners and learning rather than the technology.

In recent years, natural language processing with the help of artificial intelligence has made considerable progress in being able to "understand" language. Axiomatically, computers do not actually understand language, but follow algorithms to perform tasks, such as extracting information from "unstructured" raw language and placing it into "structured" language. "Unstructured" language refers to natural language that is not compartmentalized into tables that could be housed in a spreadsheet or database. "Structured" language refers to language that is compartmentalized. Each of the compartments can be referred to using coordinates. This structured language (i.e., data in tables) can be easily accessed by computer software while natural language is less easily accessed. The late Adam Kilgarriff an influential corpus and computational linguist and co-founder of Sketch Engine (Kilgarriff et al., 2014), often argued that all language is inherently structured by language systems, such as morphology and syntax (Kilgarriff, 2005).

Intelligent CALL can use natural language processing to search raw "unstructured" language (e.g., articles, books, essays) and categorize items. This categorization may help learners learn a language. Computational linguists, generally speaking, are focused on publishing cutting-edge research, which tends to mean creating a system that is more accurate, more powerful or faster than existing systems. There are, however, some researchers with a strong interest in language acquisition who are working in iCALL. Elena Volodina and her colleagues in Scandinavia have also been working extensively in the iCALL field on Scandinavian languages rather than English. Volodina, Borin, Lofsson, Arnbjörnsdóttir and Leifsson (2012) describe a system architecture that they developed to house iCALL resources and applications designed for any Scandinavian language. Natalia Bogach and her team at Peter the Great St. Petersburg Polytechnic University has been working on a computer-assisted prosody teaching tool that uses pitch visualization technology in Android mobile application (Boitsova et al., 2018). In the United States, Evgeny Chukharev-Hudilainen harnesses natural language processing to design iCALL tools that provide feedback on writing (Chukharev-Hudilainen, 2019; Chukharev-Hudilainen & Saricaoglu, 2016) and pronunciation (Qian, Chukharev-Hudilainen, & Levis, 2018). These tools are adaptive, scalable and effective, but what is particularly notable about the tools is their basis on empirically-proven pedagogic principles. Headway is also being made in Japan. The theme of the 2019 Conference of Japanese Association of Language Teachers Computer Assisted Language Learning Special Interest Group was artificial intelligence and machine learning in language education. This no doubt will act as a catalyst to researchers with proficiency in linguistics, education and computer science. Some language researchers in Japan have already developed tools that can be classed as iCALL. Gary Ross and his team at Kanazawa University are working on web speech technology and are using AI to analyze data on spoken patterns collected from an innovative online conversation practice platform in which users act out one-side of a dialogue (Ross, 2018).

Patterns

An individual instance cannot be considered a pattern. When instances are repeated, the repetitions are either random or patterned. The concept of randomness simply means that no pattern is discernable. Imagine that each word in a dictionary is written on separate slips of paper and placed in an opaque box. The box is shaken, and then ten slips of paper are picked up one by one. The words are placed in order of selection face up on a desk to create a sentence. There is a slim chance that a grammatically correct sentence is formed, but there is a substantially higher probability that the sentence is non-sensical and ungrammatical. In this case the words were selected randomly with no bias. However, what if the paper sizes differed with long words written on longer slips and short words on shorter slips? There was no bias in frequency, but this bias in surface area increases the odds that the selector can pick up large or small slips at will. Assuming a hand is used, the hand size may dictate which size pieces of paper are easier to be picked up. Various factors can creep in and bias randomness. In this example, physical factors, such as thickness and curvature of the paper, can alter the outcome. Humans are adept at seeing patterns, but conversely are poor at creating randomness. When asked to choose random numbers, random animals or create multiple choice quizzes in which the answers are randomized, we perform less well than automated systems.

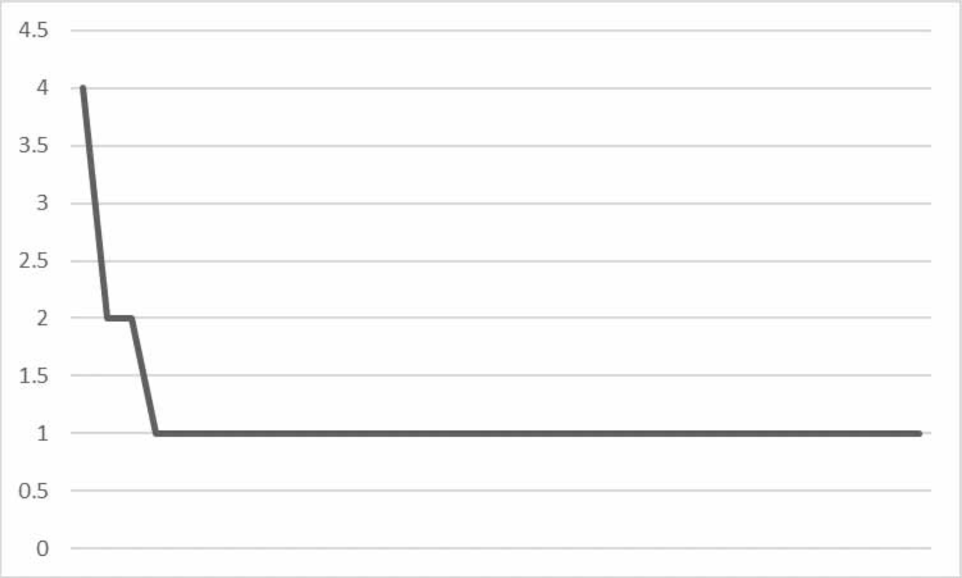
Repetition is a necessary precursor to a pattern, but repetition does not necessarily result in a pattern. The number of instances necessary to create a pattern that can be perceived varies depending on its mode, medium and complexity. For example, when learning a language, some words occur more frequently and some words occur less frequently. In English, the pattern of the most common word, the definite article *the*, is rather complex but despite the multiple reasons that can explain the usage of the definite article, the most noticeable pattern is that it is almost always followed by a noun, which may or may not be the subsequent word.

Patterns in language

Being able to recognize which words are most frequently used can help learners prioritize which words to learn first. For example, should a learner attempt to learn a language from reading a seminal book, such as learning Arabic from the Qur'an, Latin from Odes by Horace or Greek from the Odyssey by Homer. It would make little sense to focus on *hapax legomena,* that is words that only occur once in a text. However, in authorship analysis *hapax legomena* help to provide a fingerprint for the lexical repertoire of a writer (Savoy, 2012). Language courses and coursebooks are frequently designed based on the frequency with high frequency words and grammatical constructions being prioritised. This principle is found in both books aimed at children learning their mother tongues and learners of second or additional languages (Thornbury, 2002).

In an interesting twist, although a single instance of a particular word cannot be considered a pattern, there is actually a pattern formed by all the single instances of words. This pattern is so reliable that, to date, each time this pattern has been observed, the predicted result was correct. The pattern is one of the few scientific laws that relate to language, and is described by Zipf's law (Altmann & Gerlach, 2014), which is illustrated in Figure 1.

Figure 1. Plot of the frequency of words in frequency order for the example sentence



Patterns permeate language (Kilgarriff, 2005). Arguably, language is patterns. Patterns can be found at every level in the language system from phonemes and graphemes to morphemes to lexis to phases to clauses to sentences to paragraphs to texts. Table 1 provides example items and patterns from three different language systems.

Table 1. Examples of a few language systems

Language system	Example item	Example pattern
• Phonemic	• /k/	• Realized by letters c, ck, k, ch
• Morphemic	• -ment	• Verb to noun transitions (e.g., advertise, advertisement)
• Lexical	• Collocation	• Black and….. [white, blue]

Words that frequently co-occur are said to collocate. The association strength of collocations can be measured statistically and from this the probability of one word following another can be predicted (Evert, 2009). Collocation is the basis of predictive text that is a feature of not only short messaging services (e.g., texting) but is now rolled out as a feature in Google's email service, Gmail. Patterns manifest themselves in many forms. Patterns related to word length and word frequency in English are described to show how noticing patterns can help learners of English.

Word Length

Language learners pick up on prominent patterns. Learners differ in their abilities to perceive patterns with some language learners are more adept at aural, visual or spatial patterns. More visually inclined learners may notice that there is a pattern in English (and many other languages) that relates to word length. There is a length pattern in many languages with comparatively short words occurring between longer words. In English the shortest words consist of one or two letters. The grammatical classes for the majority of these words are personal pronouns (e.g., I, he, it), indefinite articles (i.e., a/an) and prepositions (e.g., in, at, on). Personal pronouns are frequently used as the first word in simple sentences, especially sentences that occur in coursebooks aimed at beginners. Indefinite articles follow a strict pattern, occurring before singular nouns. Prepositions also occur before nouns, but their syntax is not as strict as indefinite articles, and they may occur in other positions, such as when the preposition collocates with a verb.

The length pattern is based on the part of speech (POS) of words. This pattern is easy to notice and visualize. A simple script can be used that automatically annotates each word with its POS tag. Another script can be executed that colorizes the words associated with each POS tag. The result would be that words in the same POS class will appear the same colour. This can help reveal patterns that learners may not have discovered otherwise. One pattern that commonly occurs in scientific texts is the stacking of prepositional phrases (Benelhadj, 2019). Colorizing prepositions and their associated noun phrases may help show language learners how details are packed into scientific texts using multiple prepositional phrases.

The first sentence in the abstract of this chapter is reproduced below. Prepositions are shown in bold. Noun phrases following prepositions are underlined.

This chapter aims to show readers the importance and application **of** pattern matching **in** learning languages*; specifically, it will focus* **on** the application **of** natural language processing *to address specific problems* **of** Japanese learners **of** English **at** *a* public university.

The sentence with all prepositional phrases removed now reads:

This chapter aims to show readers the importance and application …; specifically, it will focus … to address specific problems ….

The general meaning of the sentence can still be inferred from the grammatical subjects, verbs and objects, but the specific details are lacking. The prepositional phrases extracted from this sentence are placed in alphabetical order here:

at a public university
in learning languages
of English
of Japanese learners
of natural language processing
of pattern matching
on the application

The pattern of a short word, prepositions in these cases, preceding noun phrases can be seen. The high frequency of prepositional phrases is typical of academic and scientific writing, and so the pattern of stacking prepositional phrases should be noticed by those reading and writing such texts.

Word Frequency

Word length is closely related to grammatical categories. Word frequency, however, trumps length in terms of importance. Most language coursebooks present vocabulary in frequency order introducing words that are more commonly used before those less commonly used words. Word frequency is a key indicator that can help learners assess whether candidate words are worth the effort of learning. Learners of English soon realize that function words are used far more frequently that content words, and so these grammatical words deserve more attention. Function words are the grammatical "glue" that hold a sentence together. These words are often guessable. The same sentence is reproduced below without the function words.

___chapter aims __ show readers ___ importance __ application __ pattern matching __ learning languages; specifically, it ___focus __ __ application __ natural language processing __ address specific problems __ Japanese learners __ English __ __ public university.

This time, the same sentence is reproduced below without the content words. These content words are unlikely to be guessed. This is because function words belong to a closed set of words while content words do not.

This ___ ____ to ___ ____ the ___ and ___ of ___ ____ in ___ ____; ___, ___ will ___ on the ___ of ___ ____ ___ to ___ ____ ___ of ___ ____ of ___ at a ___ ____.

Table 2. Table of function and content words

Function words		Content words			
• a	• at	• address	• aims	• application	• chapter
• and	• in	• English	• focus	• learners	• importance
• of	• on	• it	• Japanese	• language	• languages
• the	• this	• learners	• learning	• matching	• natural
• to	• will	• pattern	• problems	• processing	• public
		• readers	• show	• specific	• specifically
		• university			

Each word in the sentence is classified as a function or content word in Table 2.

It can be seen that the number of content words far outstrips the number of function words. In fact, three of the function words are repeated, *of* (4), *the* (2) and *to* (2), while none of the content words are repeated. Some content words are related semantically, but take different grammatical forms. Examples of semantically-related words are given here:

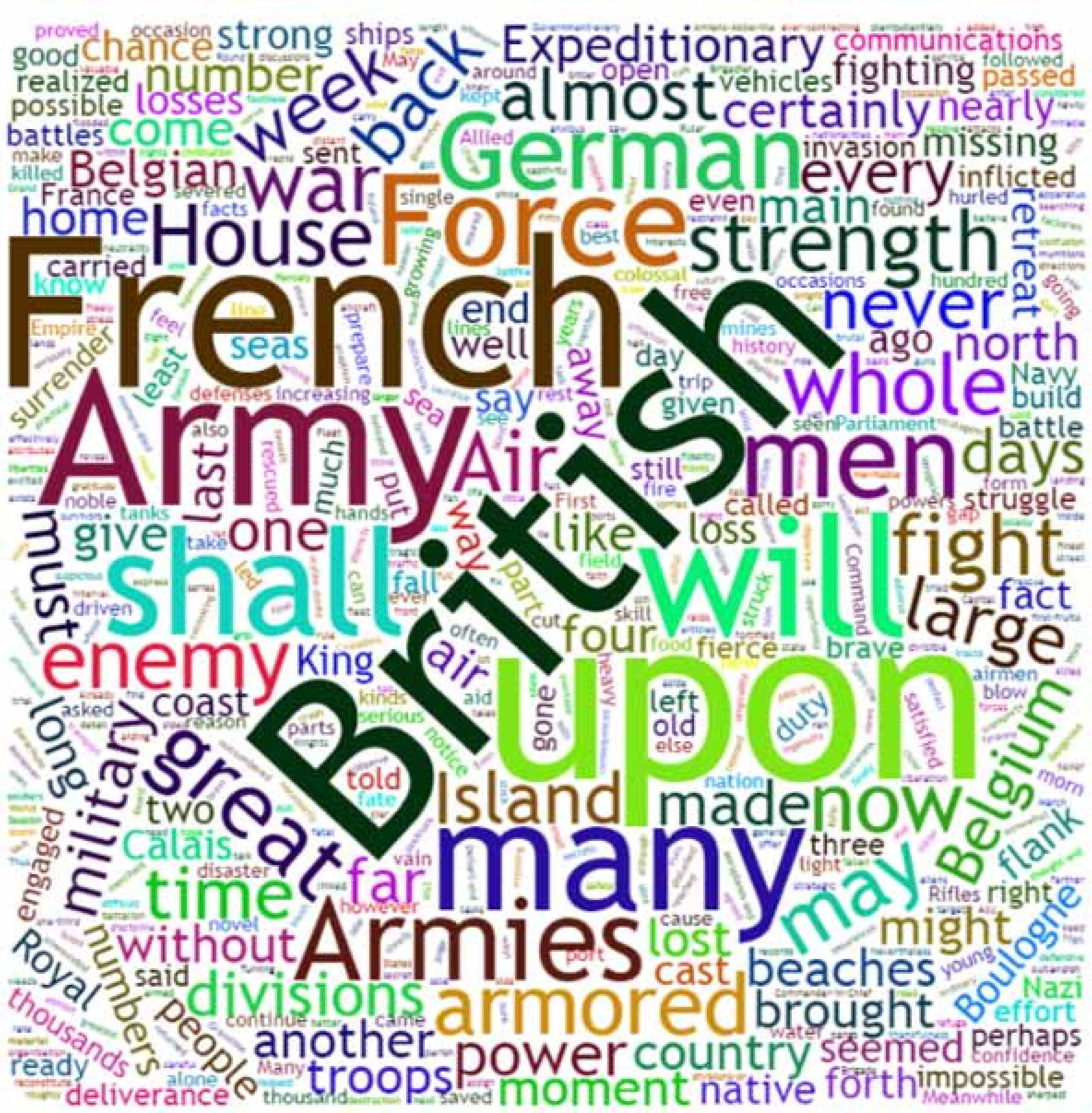
specific (adjective) cf. specifically (adverb)
language (singular noun) cf. languages (plural noun)

learning (-ing form, uncountable noun) cf. learners (plural noun)

When the words are listed in frequency order and plotted against frequency, the resultant graph is non-linear and shows an inverse relationship between frequency order and frequency (i.e., the higher the frequency, the lower the order). The graph shown in Figure 1 illustrates the non-linear pattern that is described by Zipf's law, which states that the frequency of a word is inversely proportional to its rank in frequency. This enables language users to draw upon a "miniature lexicon for efficient communication" (Kanwal, Smith, Culbertson, & Kirby, 2017). As predicted by Zipf's law, the tail of the graph contains a large proportion of *hapax legomena*, words occurring once, which are usually expected to comprise between 40 to 60% of any corpus.

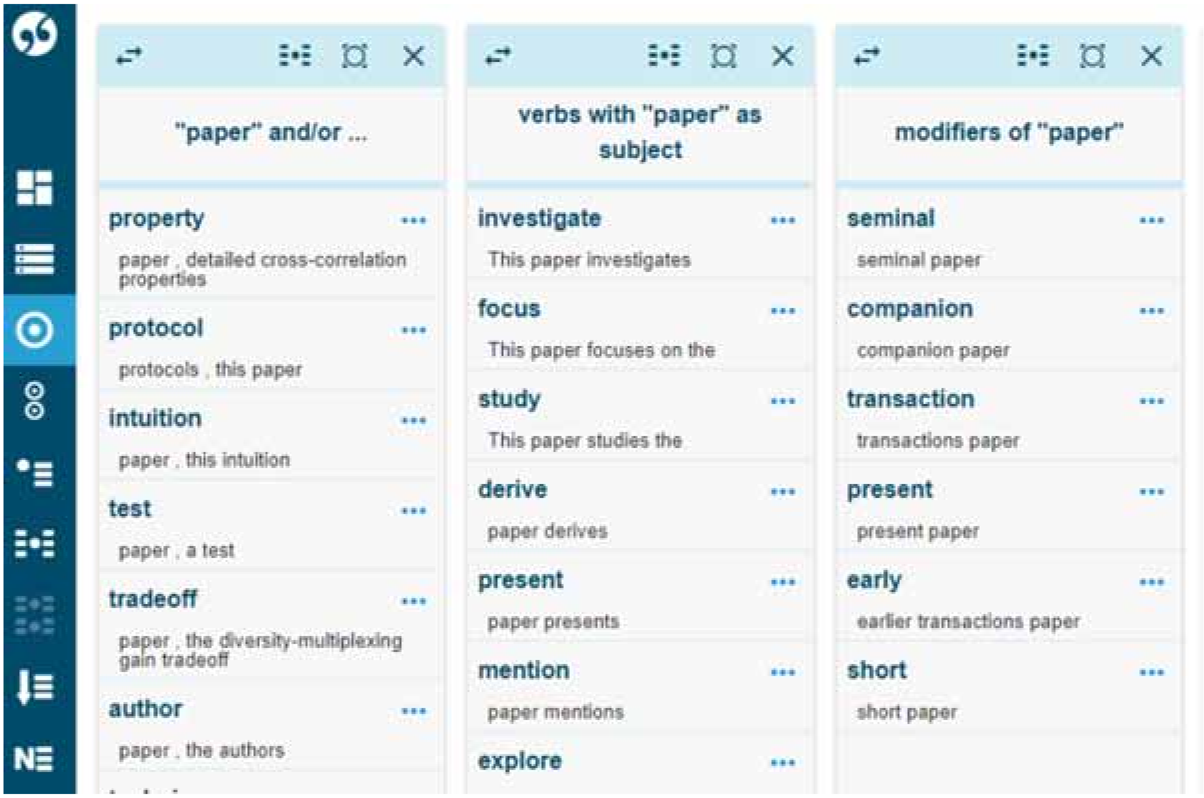
Word frequency lists can be created by using a script to count the instances of each word in a text. There are a number of online text profilers providing easy-to-use interfaces that can be used to identify not only a frequency list, but a breakdown of the words in a text according to published frequency lists, including academic word lists. Relative word frequency can be visualized using word clouds. Word clouds show the proportional frequency of content words in any text by using larger fonts for more frequent words and smaller fonts for less frequent words. To avoid function words dominating the cloud, stop lists of function words are usually utilized. Figure 2 shows a word cloud of a draft of this chapter. Word clouds can be used to provide a lexical summary of a text or corpus, priming readers with not only the specific words that appear in a text, but engaging readers to work out what the text will be about (by spotting a pattern in the words). The word cloud in Figure 2 is of a famous speech by Sir Winston Churchill, a British politician. Those with a knowledge of British history will be able to immediately recognize the speech from the word cloud.

Figure 2. Word cloud of speech by Winston Churchill (1940)



Word frequency can also be used to work out which words tend to co-occur. Sketch engine, a tool designed by Kilgarriff et al. (2014) provides word sketches using measures of association. Figure 3 shows an extract of a word sketch for the word *paper* in a tailormade corpus of scientific research abstracts in the field of information theory.

Figure 3. Word sketch for the word paper in information theory abstracts



"paper" and/or ...

property
paper , detailed cross-correlation properties

protocol
protocols , this paper

intuition
paper , this intuition

test
paper , a test

tradeoff
paper , the diversity-multiplexing gain tradeoff

author
paper , the authors

verbs with "paper" as subject

investigate
This paper investigates

focus
This paper focuses on the

study
This paper studies the

derive
paper derives

present
paper presents

mention
paper mentions

explore

modifiers of "paper"

seminal
seminal paper

companion
companion paper

transaction
transactions paper

present
present paper

early
earlier transactions paper

short
short paper

Pattern Detection

The innate ability to discover patterns helps humans learn how languages are "encoded, processed and modified" for communicative purposes (Mattson, 2014, p.7). Good language learners are thought to be good pattern matchers, who can notice systematic variations in language features, such as syntax, verb inflections and collocations (Sykes, 2015). It is only possible to learn from a pattern if the pattern is noticed. The noticing hypothesis (Schmidt, 2010) is not a new concept as it has been discussed for over thirty years. Teachers of English as an additional language tend to foreground patterns making it easier for language learners to focus on the target language. Substitution drills can be used for controlled practice to stimulate learners to recall the target pattern. Teachers may use generative situation to maximize learners' opportunity to practice particular structures.

For example, a teacher of intermediate English learners may get students to work in pairs and underline every instance of passive voice in a newspaper article. On completion, student groups could discuss the reason for the use of passive voice for each instance. The teacher can then explain that passive voice tends to be used to focus on the action or process rather than the actor or the doer. This can be done to hide the doer because *inter alia* they are unimportant or obvious. Following this focus on receptive skills, the class could then move onto productive skills, possibly rewriting a narrative that is written in active voice. This type of learning closely matches Nation's four stands model (Nation, 2001; Nation

& Newton, 2009) in which classroom activities are divided into meaningful input, meaningful output, language-focused instruction and fluency practice.

Various simple patterns can be discovered using a corpus and a concordancer using the key word in context (KWIC) function, which aligns instances of the same word to the center of the viewport (Scott & Tribble, 2006). The KWIC function is a simple feature commonly built into corpus software and helps users identify collocations and colligations, that is the grammatical patterns associated with a lexical item. The processing power of computers is so vast that they can discern patterns that humans are unable to detect. Subtle patterns, however, may necessitate the use of more sophisticated statistical models, such as principal component analysis and factor analysis.

DISCOVERY LEARNING

Discovery learning is premised on the noticing hypothesis. Many language learners have experience of noticing a language feature and from that moment have a sense that they learnt it. This leads many to accept the hypothesis despite the lack of experimental and empirical evidence. The hypothesis makes sense and continues to underpin many language teaching approaches and methods. Skehan (2016) notes that noticing needs to be followed by pattern detection to enable learners to generalize from the language noticed. Noticing involves the learner searching for particular language features. On discovering the language features, learners have the opportunity to learn. Discovery learning is a type of inductive learning, in which learners generate their own rules to explain discovered phenomena. Bruner (1961) advocated inquiry-based instruction for language learning. Such learning is said to be engaging, motivating and promotes autonomy. Mayer (2004) later argues convincingly that a guided learning approach is more effective than the pure discovery learning approach. DDL tends to make use of collections of texts or corpora.

Data driven learning (Johns, 2002) puts students at the centre of the learning process. Feedback from students using data driven learning approaches is not always positive. Common complaints are the difficulty of trying to understand ungraded language. As the proportion of unknown words increases in the text or corpus that they are examining, the difficulty of the task increases. Cotos, Link and Huffman (2017) found that graduate students who undertook guided DDL using a specialist corpus were able to improve the "rhetorical, formal, and procedural aspects of genre knowledge" (p. 104). Mizumoto and Chujo (2015) provide a meta-analysis of DDL approaches in EFL in Japan, and showed that in primary education focusing on vocabulary acquisition DDL was effective.

The use of corpora in lessons places the focus on authentic language and tends to adopt a frequentist perspective (Boulton, 2017; Boulton & Cobb, 2017). Words can be ranked according to raw frequency, disproportionate frequency as measured by keywords and simple KWIC concordance line results can be used. Students shift through language data for a particular purpose. Lee and Swales (2006) describe an approach that raises rhetorical consciousness through technology-enhanced interactions using specialist and self-compiled corpora. Purposes vary, but searching for particular patterns of language, such as collocation and colligation. Baker (2006) claimed that students were able to make generalizations about linguistic patterns using authentic corpus examples. To discover collocations, students can load a specialist corpus into a concordancer, such as AntConc (Anthony, 2019). Colligation tasks include searching for the typical tense or voice that as associated with particular verbs. The verb *bear*, for example, tends to be used in past simple tense and passive voice, as in "He was born yesterday." To reduce the cognitive overload, a number of researchers have tried to filter corpus results to manageable proportions (Frankenberg-Garcia, 2014; Huang, L.-S, 2008; Mizumoto & Chujo, 2015; Smart, 2014).

Pedagogic Pattern Matching

Another discovery learning approach, however, is to harness an iCALL tool that uses automatic pattern matching and visualization to focus learners on the most important patterns. Pattern matching and visualization can be used to help language learners notice and learn language features in context. The use of pattern matching tools in language learning classes enables teachers to adopt learning approaches that are data-driven or data-informed (Godwin-Jones, 2017). The pedagogic power of pattern matching is predicated on the premise that to learn a particular language feature it is necessary to notice the language feature. The advantage of using iCALL tools to learners is that the software development team has already selected the patterns worthy of attention, and so learners spend less time filtering out unnecessary language, and can focus on the target language more easily than in typical DDL.

Intelligent CALL tools can involve both top-down move-analysis approaches and bottom-up linguistic feature approaches (Cotos et al., 2017). By combining the power of natural language processing with the behaviour and interaction properties of websites and applications, learners can be automatically guided and assisted to discover patterns that were either preselected or can be discovered using an algorithm. The automated mechanism to help learners see new patterns comprises two steps: matching and manipulating. The matching, viz. the identification step, can be achieved via pattern matching or recognition. Regular expressions (Regex) can be created to search texts for specific combinations or permutations of letters or characters. Regex are, in the words of Christiansen and Torkington, (2003) akin to “mutant wildcards on steroids” (p. 180). Regex are powerful search tools that can be used to identify predetermined patterns. Once a particular pattern is matched, the discovered language features can be highlighted. This could be achieved by using JavaScript to control the behaviour of elements in a webpage to emphasize the matched language feature by altering its colour or size. For example, software designed to focus on verb phrases that users input could, on matching a verb phase execute a function that colorizes the matched string of words and provides a label stating the voice and tense of the verb phase.

As an example, consider the lexical set of quantifiers can be matched using simple regular expressions and classified into four distinct categories based on the grammatical category of nouns that they can precede. The four categories (Q1 to Q4) are listed here:

Q1: quantifiers for singular nouns, e.g.{each, every, one}
Q2: quantifiers for plural nouns, e.g. {both, many, a number of, several}
Q3: quantifiers for uncountable nouns, e.g. {much, little}
Q4: quantifiers for uncountable and plural nouns, e.g. {all, a lot of, lots, most, plenty of, some}

For each of these categories a separate regular expression can be created. When the regular expression matches any of the elements, the matched word can be highlighted in bold. Each of the four categories can be assigned a different background colour. When any element is matched, the assigned background colour can be displayed behind the matched string. The result will be an online text in which quantifiers are colour-coded to highlight the grammatical categories associated with each quantifier. This manipulated text can be used by learners from absolute beginners through to upper intermediate. The colorized texts helps learners differentiate between the four grammatical categories of quantifiers.

ICALL TOOLS FOR LANGUAGE LEARNING

There are numerous iCALL resources that use pattern matching and detection. These include online concordancing tools, word sketches and text profilers. In a Japanese university dedicated to computer science, a number of online pattern-matching tools have been developed for language learning purposes. WordBricks (Purgina et al., 2019) is a gamified mobile app designed to help learners acquire syntax by experimenting with jigsaw-like word bricks to create syntactically accurate sentences. At the same university, the Pronunciation Scaffolder was created to help undergraduate Japanese students deliver scripted presentations. This iCALL tool uses natural language processing to automatically visualize various pronunciation features (e.g., intonation, word stress, sounds) of texts submitted using colour, size and symbols. The following subsections describe and evaluate each of these tools in turn.

WordBricks

WordBricks is designed to be able to work for any language, but was developed for Japanese learners of English. Although this language learning game uses pattern matching, the motivation for the tool was to provide a gamified language learning experience by representing words or phrases in sentences as jigsaw pieces and then allow players to fit the jigsaw pieces together in order. WordBricks allows sentences that are syntactically accurate regardless of the semantics. This focus on form allows learners the freedom to play with words in the same way as children can enjoy nursery rhymes with lines like "The cow jumped over the moon …. And the dish ran away with the spoon." Children acquiring language may replace the nouns and create their own semantically-incorrect sentences, such as "The monkey jumped over the sun."

Languages comprise syntactic elements that combine in specific orders. Some languages, such as English, are fairly rigid in the order of words. Deviations from the expected order may be grammatically possible and treated as marked (i.e., less frequent) forms. Other deviations are treated as grammatically incorrect. WordBricks assigns syntactic elements to a particular class. Each class is attributed with a set of grammatical attributes that determine the elements that co-occur with it. For example, the verb "love" is assigned as a transitive verb. The attributes assigned could include that the actor occurs to the left of the verb in the subject position, the receiver to the right in the object position, any adverb of manner is placed after the receiver while adverbs of frequency can occur between the subject and the verb. WordBricks provides visual clues using shape and colour to show users how each syntactic element works.

This tool relies on pattern-matching. The possible permutations are derived on each placement of a brick. A script is executed that checks whether the adjoining bricks allow the placement of a brick. This can be visually deduced, since if the available position in a clause is rectangular, then only a brick that is rectangular will be permitted. The user can match the pattern visually or linguistically. The idea being that as the user gains familiarity with the bricks, mastery over the allowable syntactic combinations will increase.

WordBricks was positively received by both learners and teachers. When used for teaching grammar, the simplistic rules described in typical textbook grammars mask the true complexity of natural language. This simplification of grammar may be pedagogically justified, but does not sit well with computer scientists seeking to create expert systems that can deal with all possible use cases. Some grammatical rules are difficult to implement in WordBricks because of vaguely defined categories, semantic concepts, and the necessity for world knowledge to disambiguate different items.

WordBricks is gamified, and so this can help to overcome the lack of inertia that demotivated learners of English may display. Teenage learners of English in Japan have spent many hours completing grammar drills and rote learning vocabulary to pass university English entrance examinations. This grammar game provides a novel way to help learners review or recall grammatical structures and hone their knowledge about language, particularly the part-of-speech of words. Learners are encouraged to experiment and construct syntactically accurate sentences. At the same time, they discover how word choice affects brick type. Brick type is primarily determined by part-of-speech (POS), but the POS in turn affects the compatibility of connecting bricks. For example, adjective bricks may follow copula verbs or precede nouns, but most adjective bricks are unable to precede copula verbs or follow nouns. Descriptive grammars state various grammatical rules, but with WordBricks users experiment in a virtual lab and try various positions for words, but only positions that are grammatically possible will be allowed.

WordBricks was tested with pre-intermediate Japanese learners who were studying grammar. At the University of Aizu computer science majors enrolled in an EFL course were divided into a control group ($N = 11$) and an experimental group ($N = 10$). All students were given pre-tests and post-tests on two units both of which focus on uncountable and countable nouns, which are challenging for Japanese learners of English. The post-test for countability involved identifying grammatical errors in sentences while in the post-test for articles learners were asked to complete sentences with an appropriate noun form. During the study all participants studied with the same teacher for four months. The control group were taught about countable and uncountable nouns using a teacher-centered, grammar-focused approach that students were familiar with. The experimental group were provided with tablet PCs loaded with WordBricks with predesigned exercises, based on the same course syllabus.

The results of this preliminary study (Park, Purgina, & Mozgovoy, 2016) were positive with the experimental group scoring relatively higher than the control group in both post-tests as shown in Table 3.

Table 3. Pronunciation features

Unit	**Test**	**Group**	**Number of students**	**Mean score** *(M)*	**Standard deviation** (*SD*)
• First	• Pre-test	• Experimental	• 10	• 15.90	• 4.43
		• Control	• 11	• 15.18	• 5.04
	• Post-test	• Experimental	• 10	• 24.20	• 4.02
		• Control	• 11	• 21.00	• 5.80
• Second	• Pre-test	• Experimental	• 10	• 4.20	• 2.57
		• Control	• 11	• 6.00	• 2.72
	• Post-test	• Experimental	• 10	• 11.60	• 2.84
		• Control	• 11	• 9.18	• 4.17

Descriptive statistics of the pre- and post-tests from the first unit show that the pre-test mean scores in the experimental group ($M = 15.90$, $SD = 4.43$) and the control group ($M = 15.18$, $SD = 5.04$) were similar. In the post-test, the experimental group ($M = 24.20$, $SD = 4.02$) performed slightly better than the control group ($M = 21.00$, $SD = 5.80$). The pre-test scores differed more in the second unit with the control group having a higher mean score (*M* = 6.00, *SD* = 2.72), which increased in the post-test (*M* = 9.18 *SD* = 4.17), yet the post-test mean score in the experimental group almost tripled to 11.60 (*SD* = 2.84). These results show that the experimental group outperformed the control group on the post-test. Although there is a strong likelihood that students were engaged more deeply with WordBricks and that was the cause of the increase, sceptics could argue that other causal factors were at work.

Pronunciation Scaffolder

The Pronunciation Scaffolder (Blake, 2019) is designed to help learners of English who need to read presentation scripts aloud. The impetus for the creation of this tool was to help Japanese undergraduate students at the University of Aizu who need to deliver presentations in English to fulfil their graduation requirements. However, for students who lack confidence and practice in speaking, this is particularly difficult. Students tend to write the full script of their presentation to compensate for their lack of ability (or confidence) to produce grammatically accurate speech when reading notes. Despite having the exact wording prepared in advance, students still struggle to read the words. The Pronunciation Scaffolder does not address specific issues of public speaking, but focuses on basic reading aloud skills, such as where to pause, how long to pause for, which syllables to stress and which words carry less stress.

The Pronunciation Scaffolder provides users with the choice of which features they want visualized. There are three categories, six features and nine function buttons. Pronunciation features are divided into three categories: core, optional and advanced. The core features are recommended for lower-level learners and include pausing, intonation and content words. The optional features are word stress, sounds of the letter “s” and two graphemes, “-ed” and “th.” These features are designed to provide additional assistance to Japanese learners with specific difficulties. The advanced feature is linking, which is subdivided into linking from consonant-ending words and vowel-ending words. The annotations are created using rule-based parsing to identify patterns. Once a pattern is identified, the pattern is annotated and visualized. The visualization is realized by using JavaScript to colorize the text, alter its size or insert symbols, such as arrow heads. Table 4 shows the pronunciation features that can be visualized.

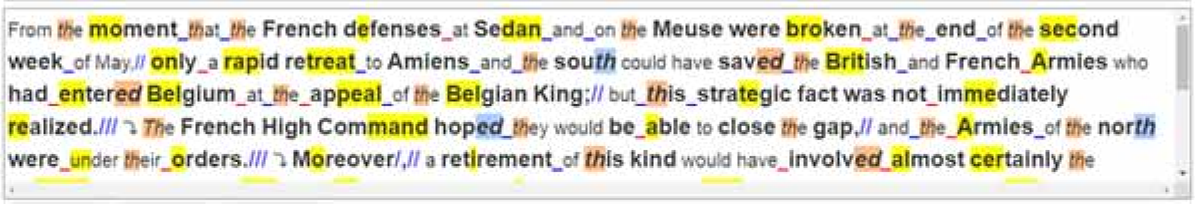
Table 4. Pronunciation features

#	Feature	Purpose of annotation
• 1	• Pausing	• show short, medium and long pauses
• 2	• Intonation	• show falling and rising intonation
• 3	• Rhythm	• stress content words more than function words
• 4	• Word stress	• locate syllable carrying primary stress
• 5	• Sounds	• disambiguate between letters realized by different sounds
• 6	• Linking	• shows elision, intrusion and linking

Figure 4 shows the political speech delivered by Sir Winston Churchill in 1940, which incidentally is the same speech used for the word cloud shown in Figure 3. Visualization is shown for pausing, intonation, content words, word stress, -ed endings, th sounds and linking from consonant-ending words.

Figure 5 shows the key to the annotations that uses colour and symbols. For example, word stress is shown by bold letters on a bright yellow background.

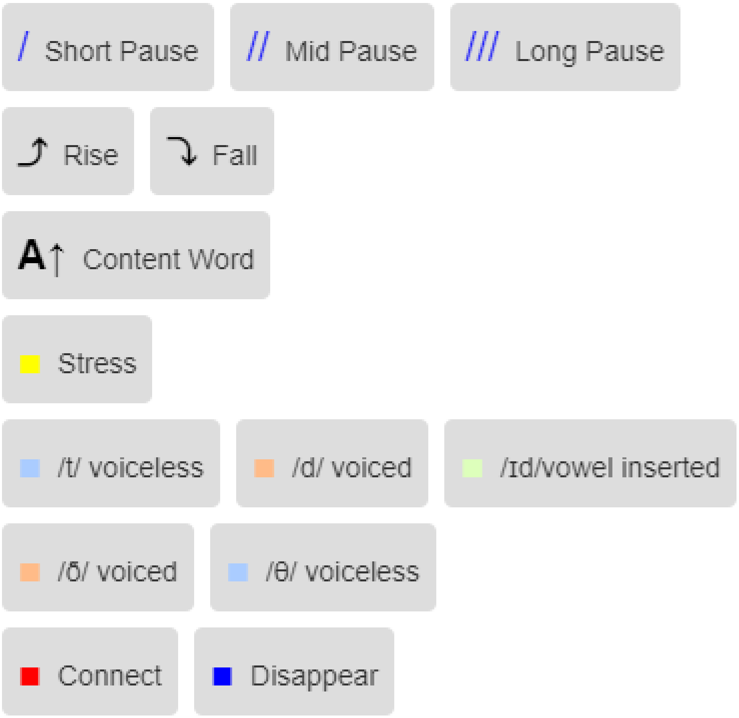
Figure 4. Speech annotated by the Pronunciation Scaffolder



From the moment_that_the French defenses_at Sedan_and_on the Meuse were broken_at_the_end_of the second week_of May,// only_a rapid retreat_to Amiens_and_the south could have saved_the British_and French_Armies who had_entered Belgium_at_the_appeal_of the Belgian King;// but_this_strategic fact was not_immediately realized./// ↴ The French High Command hoped_they would be_able to close the gap,// and_the_Armies_of the north were_under their_orders./// ↴ Moreover/,// a retirement_of this kind would have_involved_almost certainly the

Regular expressions parse for predetermined patterns to identify each pronunciation feature. One straightforward pattern is to identify words ending in -ed. Once the word has been identified, the -ed ending needs to be classified into one of the three possible pronunciations, namely voiced /d/, voiceless /t/ or vowel-added //ɪd/. Regular expressions were created for each of the three categories. This tool is currently unable to discriminate between words ending in -ed that have two possible pronunciations. For example, the word *learned* as an adjective is pronounced differently from the word *learned* as a verb. Should part-of-speech (POS) tagging be used prior to the rule-based parsing, this ambiguity could be resolved by matching both the POS tag and the raw text.

Figure 5. Key to the annotations used



A preliminary study of effectiveness was undertaken with twenty university students enrolled in a compulsory English course at a private university in Thailand. To test the effectiveness of version 2 of the Pronunciation Scaffolder students listened to a text-to-speech engine reading a presentation script, and then practised reading aloud. Students selected the text, web-enabled device and recording software themselves. They audio-recorded themselves reading both a raw script and an annotated script. Assessors ($N = 5$) who worked at the same university, but who were unaware of context or research aim were asked to judge the quality of the delivery of both presentations. Assessors were asked "which recording (if any) sounds better?" The rather vague terms "better" and "sounds" were chosen to avoid a framing bias in the evaluation. Recordings were played in random order. For the higher proficiency students ($N = 4$) assessors rated both recordings as being the same, but for the less proficient students ($N = 16$) assessors rated the reading of the annotated script as being better. The Pronunciation Scaffolder improved the quality of the pronunciation of the presentation for all lower-level students in this study. Although this is a small-scale study, this adds weight to anecdotal evidence that lower-level students benefit from using this tool.

FUTURE RESEARCH DIRECTIONS

This chapter has shown the ubiquity of patterns, and how harnessing pattern matching and detection can enhance data-driven language learning. The integration of NLP has brought traditional CALL into a new era of intelligent CALL. The number of language learning platforms that integrate iCALL technology is increasing rapidly. The increased access to Wi-Fi combined with year-on improvements in software and hardware provide a firm foundation for iCALL to take a more prominent role in language learning. NLP can be used to assist language learners analyze both native and learner language. This can be achieved through sophisticated NLP pipelines or relatively simple rule-based algorithms. Advances in artificial intelligence, such as neural networks and deep learning have already brought about radical breakthroughs in machine translation, and appear set to radically alter the world of technology-enhanced language learning.

Future research will focus on the development of iCALL tools, measuring their accuracy, speed and usability. These aspects are likely to be those foremost in the minds of computer scientists and computational linguists. However, the pedagogical side of iCALL tools is the primary consideration and so the effectiveness and the efficiency of the tools needs to be evaluated through both empirical and experimental studies. With any experiment study involving humans, particularly those that focus on learning processes, a particular challenge is to create a study from which statistically valid generalisations can be made. The solution to this problem is beyond the remit of this chapter, but one which needs to be addressed in order to evaluate the efficacy of iCALL.

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KEY TERMS AND DEFINITIONS

Algorithm: A set of rules to be followed.

Discovery learning: A theory in which learners reflect on their experiences to discover new ideas.

Hapax legomenon: Words that occur only once within a particular text or corpus of texts.

iCALL: iCALL stands for intelligent computer-assisted language learning, which refers to the use of natural language processing for language learning purposes.

Machine learning: When computers use artificial intelligence to learn from data or experience.

NLP: NLP stands for natural language processing, which uses computational methods to analyze natural language.

Pattern: Pattern describes items that are organized regularly not randomly.

Regex: Regex and Regexp stand for regular expressions, which are powerful search expressions that can match characters, words and/or strings.

Rule-based parsing: A process that use rules related to syntactic structure to divide written texts into components.

Zipf's law: This law states that the frequency of a word is inversely proportional to the rank in frequency of the word.

Chapter 2

Pedagogical Considerations for Successful Implementation of Virtual Reality in the Language Classroom

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ABSTRACT

Virtual reality (VR) offers unique opportunities for immersive activities previously not possible in the language classroom. However, as with any new instructional medium, it is difficult to employ these technologies effectively. There is often a gap between teachers' understanding of how to use the technology and the pedagogical needs of the classroom. This chapter introduces the VR Application Analysis Framework. The framework, supported by established theory, assists with the analysis and implementation of commercial off-the-shelf VR applications into language classroom tasks. This chapter explores the history of VR and the background for its potential use in the classroom. The four key aspects of the framework are presented: immersive capacity, cognitive load, purpose, and communicative capability. Four existing VR applications and their accompanying activities are presented as examples of using the framework.

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INTRODUCTION

Rapid technological advance is leading the world closer to a future where digital methods can enhance and even supplant some common aspects of reality, while providing hitherto unimaginable opportunities. Since the advent of personal computers, technologies have pushed the boundaries between reality and digital worlds. In the past, these digital worlds were presented via a number of different methods including computer screens and head mounted displays, and virtual reality (VR), the replacement of one's physical environment with an immersive digital world, emerged as the term for such experiences. Following the introduction of modern immersive headsets in the 2010s, the term is now most commonly used when referring to virtual worlds experienced through head mounted displays. VR sets itself apart from other media in that it attempts to provide a sense of presence within digital environments. This is achieved via a headset and a set of sensors that are able to react to user movements, presenting them with "a simulated environment in which a perceiver experiences telepresence" (Steuer, 1992, pp. 76-77). VR provides numerous benefits beyond other media, such as textbooks and video instruction, as it "replaces interaction with immersion; it replaces the desktop metaphor with a world metaphor; and it replaces direct manipulation with symbiosis" (Psotka, 1995, p. 410). VR can achieve a multisensory experience to promote learning by connecting it with physical action and shows the most potential when these interactions are just not practical, permissible, or possible in reality.

From its early days in the 1980s and 90s, VR has been envisioned as having a future role in educational practice (Bricken, 1990; Hedberg & Alexander, 1994; Helsel, 1992; Wickens, 1992). Joseph Psotka (1995) outlined the then current state of VR technology and predicted a future where it could be applied universally in classroom education: "Because [the student] experiences it and does not just think it cognitively, abstractly, it has a profound and lasting effect on her perception of herself and her place in the universe, without leaving her home" (p. 422). However, due to technical limitations and costs of the time, VR was unable to find a footing in the consumer market and the public's interest in VR soon faded. However, governments and research institutions continued to conduct numerous research projects exploring VR's potential. In fields where realistic training was expensive, impractical, or outright dangerous, the potential of VR outweighed the significant costs and technical limitations. Military, aerial training, and surgery are some fields that have benefited from VR's immersive capabilities (Bhagat, Liou, & Chang, 2015; Gallagher et al., 2005; Winick, 2018). Fortunately, thanks to the advent of the technology present in smartphones, consumer level VR is now possible. Untethered, self-contained VR headsets with full positional tracking and motion controls are now available at all electronics retailers, raising VR into the public consciousness once again (Jenkins, 2019).

Futurists' visions in the 1980s and 90s of VR becoming a tool for creating fully immersive learning environments for classrooms by 2020 is now in many ways possible. VR, once an emerging niche technology, has begun to mature and find widespread market adoption. Though its role in consumer and professional environments has now been largely defined, VR in education remains an evolving space. VR has the potential of being a boon to the progressing educational sector as it allows for affordances such as heightened awareness of pragmatics (Alsever, 2015) and simulating novel environments inaccessible within classrooms (Luckey, 2016).

Recent literature has been laying the groundwork for effective implementation of VR by providing insight into both educators' (Solomon, Ajayi, Raghavjee, & Ndayizigamiye, 2019) and students' (Domingo & Bradley, 2018) perceptions of VR as a teaching and learning tool. Practical use in the language classroom has been explored (Alizadeh, 2019; Bonner & Reinders, 2018; Frazier & Roloff Rothman, 2019; Hastings & Brunotte, 2017; Lege & Bonner, 2018). However, as the number of VR applications grows, it is increasingly apparent that there is a dearth of applications expressly designed for education. It is becoming difficult to find and adapt non-educational applications for use in the language classroom in an effective, pedagogically sound manner. Many existing VR applications are not explicitly designed to support teaching practices within the classroom, and this is especially true within second language education. Therefore, it is appropriate to consider commercial off-the-shelf (COTS) applications for their language learning and teaching benefits. "With their immersive, authentic content and motivational character as well as their relatively low implementation cost, such games lend themselves well to use in L2 learning scenarios" (Kronenberg, 2012, p. 52). With careful analysis, scaffolding, and task design, COTS VR applications can meet instructional aims (Bonner & Murphy, 2018).

VR has seen a recent resurgence both as a medium of entertainment and as a new tool in language education thanks to newer more capable headset displays and motion controls providing more significant immersive capabilities than typical desktop displays. However, modern headset-based VR in education is still largely in its infancy as its affordability and capabilities have only recently reached the level where VR technology can realistically be considered as a tool for classroom education. With the vast number of applications available, it can be difficult to determine which COTS VR applications could be used to enhance learning experiences, let alone how to do so. This is especially true in the language learning classroom, as one not only has to consider the content of the applications, but also the language used within it. This chapter addresses the need for a framework to guide teachers towards the best practices for implementing VR into their curricula by introducing the *VR Application Analysis Framework.*

LITERATURE REVIEW

Virtual Worlds

During the period before the resurgence of VR, the commercial video game industry made impressive strides in the continued development of virtual worlds (VWs). Benson and Chik (2011) commented that using VWs such as games should be considered as "naturalistic computer assisted language learning" (p. 11). While not able to offer the same level of immersion as VR, VWs on consoles and PCs became a viable platform to conduct educational research without cost-prohibitive equipment.

Online VWs, such as *Second Life* and *World of Warcraft,* enable users to interact in a shared virtual space that allowed live communication with a range of conversational partners, exposing them to abundant input in a target language (Peterson, 2006). Researchers such as Rama, Black, van Es, and Warschauer (2012) found that online games are a viable tool for promoting language learning in an engaging environment. VWs have been found beneficial for vocabulary learning and retention, and learner autonomy (Bakar & Nosratirad, 2013; Rankin, Gold, & Gooch, 2006). In addition, online games provide a platform for the development of interpersonal relationships, willingness to communicate, and leadership skills (Peterson, 2013; Reinders & Wattana, 2015). The communicative skills that are learned in playing video games with others can result in skill transfer to other learning environments and life outside of the classroom (Chik, 2014; Gee & Hayes, 2011). Video games have been a way to explore the use of VWs for language learning. While VR and video games differ in their method of delivery, the lessons learned from research on VWs could be applied to VR. This includes challenges players and learners may face, particularly cognitive load and overload.

Task-Based Activities

Researchers of VWs have found that in order to be effective, structured pedagogy is necessary, otherwise the L2 gains of language learning will be limited (Chik, 2014). Task-based learning teaching (TBLT) is a way to structure language learning and is defined by Ellis (2003) as "the social communication between learners as a source of input and methods of acquisition and includes the negotiation of meaning, communicative strategies, and communicative effectiveness" (p. 65). TBLT has capitalized on the unique properties of VWs, guiding learners through language acquisition by achieving linguistic and context driven goals (Cornillie, Thorne, & Desmet, 2012). Tasks may be subdivided into two types, real world and pedagogical tasks. Real world tasks are non-linguistic tasks learners could use to function beyond the walls of the classroom, whereas pedagogical tasks are employed within the classroom with a particular linguistic goal in mind (Ellis, 2003; Long, 1985; Nunan, 2013; Willis & Willis, 2001). Nunan (2013) further highlights that a task is a standalone structured activity in which learners are focused on "comprehending, manipulating, producing, or interacting in the target language" to communicate meaning rather than grammatical forms (p. 4). The framework proposed in this chapter does not dictate specific language goals (Ball, Clegg, & Kelly, 2015), but provides a way to analyze a newly affordable technology, which can be used in any instructional approach, whether content and language integrated learning (CLIL), four-skills based, English-medium instruction, or any other. For the framework, TBLT was deemed most widely applicable for integrating VR into language education, though VR applications could be adapted within any approach.

Using TBLT, VR applications not intended for language learning can be employed in tasks that meet linguistic goals by scaffolding content to focus on meaning. If new technologies are integrated into a language learning environment before proper evaluation tools are developed, the technologies will only become entertainment with no pedagogical utilization for the classroom (González-Lloret & Ortega, 2014). However, newer technologies have the potential to offer more for language learners. They may

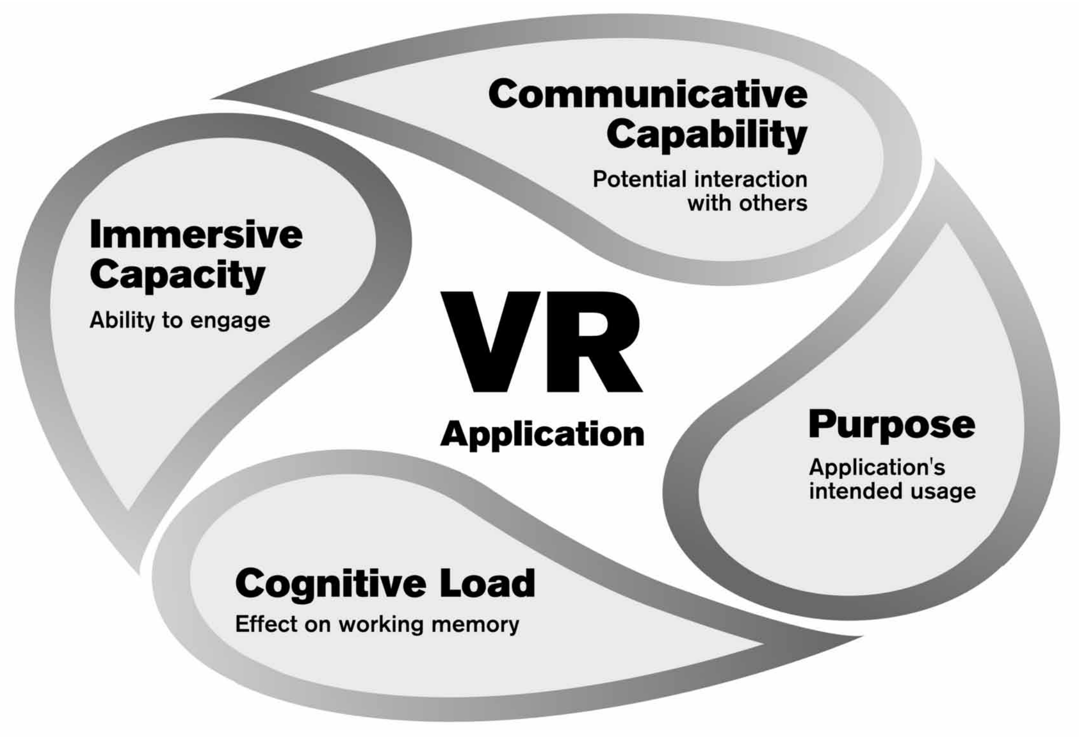
> *minimize students' fear of failure, embarrassment, or losing face; they can raise students' motivation to take risks and be creative while using language to make meaning; and they can enable students to meet other speakers of the language in remote locations, opening up transformative exposure to authentic language environments and cultural enactments, along with tremendous additional sources of input. (González-Lloret & Ortega, 2014, p. 4)*

Hence, there is a need to develop a framework to join VR applications with TBLT to maximize the potential of VR for language learning. The *VR Application Analysis Framework* presented in this chapter determines the suitability of VR applications for language learning within TBLT.

VR APPLICATION ANALYSIS FRAMEWORK

Whenever considering new technologies in educational contexts, it is important first to consider pedagogical objectives or learner outcomes, then select technology that may help learners achieve their goals (Salaberry, 2001). Mercado (2017) notes that "technology is but a means to an end and should be chosen and used carefully if it is to truly help our learners reach their fullest potential in learning a second language" (p. 20). VR applications are no exception to this maxim and must be carefully considered first before classroom use. Bitner and Bitner (2002) note that "learning should be the impetus that drives the use of technology" (p. 97). VR applications may be quite complex, and proper analysis is required to ascertain whether a VR application can meet the instructional demands of a lesson. Following proper analysis, VR applications can be scaffolded for classroom tasks. The researchers investigated literature on gaming for language learning, technology assisted language learning, task design, cognitive load, media literacy, and others. They determined that a framework for analysis of VR would need to focus not only on VR technology and software, but also language learners' experiences inside and outside of VR. With this analysis in mind, the researchers propose the *VR Application Analysis Framework*. This framework allows for confident in-depth analysis of VR applications that determines how they may be pedagogically applied in a language learning lesson. The framework examines applications through four lenses to ensure a thorough analysis: *immersive capacity, cognitive load, purpose,* and *communicative capability* (see Figure 1). The rationale for including each lens will be introduced along with varying criteria that differentiate applications into easily identifiable subclassifications.

Figure 1. VR Application Analysis Framework



The four parts of the framework, explained in detail below, help ensure that the proper analysis groundwork has been completed prior to use in a language learning environment. Without careful consideration of VR applications themselves, it is difficult to design classroom tasks that will be effective and engaging.

Immersive Capacity

VR's primary differentiating affordance is its ability to create a sense of presence, "the (psychological) sense of being in the virtual environment" (Slater & Wilbur, 1997, p. 604). Presence is shaped by the capability of the technology to deliver an inclusive, extensive, surrounding and vivid illusion of reality to the senses of a human participant" (Slater & Wilbur, 1997, p. 603). While the topic of immersion has been discussed in virtual worlds using traditional video games (Calleja, 2014; Lawrence & Ahmed, 2018), Sherman and Craig (2019) point out that "the major differences between these experiences and VR is that they only engage the participants at the mental level" (p. 10). VR's distinguishing characteristic is that it adds physical immersion to mental immersion to allow for more compelling experiences. Immersion may allow VR users to enter into a state of flow, an intense positive state of focus, but without a sense of immersion, achieving a state of flow is nearly impossible (Granic, Lobel, & Engels, 2014). VR applications can achieve the lofty goal of complete immersion with varying degrees of success. In part, the degree to which an application is able to immerse users in novel environments is dependent on external factors, such as the environment created for VR, as much as it is on the application itself. Accordingly, this facet considers the immersive capacity of the entire VR system as it works in conjunction with its software (see Table 1).

Table 1. Levels of immersive capacity and indicators

Level	Common indicators of immersive capacity
• High	• Six degrees of freedom (6DoF) of movement for users (longitudinal, vertical, lateral, yaw, pitch, roll). • 6DoF hand tracking for interaction. • High visual fidelity (refresh rates, resolution). • Visual consistency of 3D assets. • High interactivity with environment.
•Medium	• Mix of high and low immersive capacity elements. • Medium interactivity with environment.
• Low	• 3DoF of movement for users (yaw, pitch, roll). • 3DoF hand tracking or gaze-based interaction. • Visual issues (low refresh rates, resolution, distortion). • Uncanny valley (negative emotional reaction to 3D character appearance). • Low interactivity with environment.

High Immersive Capacity

The most immersive VR experiences allow for users to move about freely within defined boundaries; their motions in the real world modeled one to one in the virtual world. This can only be done if the VR system allows for full body tracking. The most immersive experiences feature six degrees of freedom (6DoF), allowing the translation of movement on a plane in addition to yaw, pitch, and roll. Put simply, this means that users' head and hand motions are mapped into the virtual world. To accommodate the freedom to move, the space designated for the VR system needs to be adequately large to maintain the illusion of presence in a virtual world. Furthermore, the head mounted display must be comfortable for the duration of the VR session. High immersion is further supported by the visual fidelity of the experience.

Technologically, displays with high refresh rates, high pixel density, and wide fields of view are more likely to immerse the user (Slater, 2009). A combination of these features allows users to avoid factors that may draw them out of the virtual world back into reality, such as aberrations and distortions, eye strain, and motion sickness (Veron, Hezel, & Southard, 1994). By avoiding these factors, users should be fairly comfortable and immersed for at least the recommended VR use time of 30 minutes (Health and safety warnings, 2019).

Perhaps, one may assume that the higher the level of graphical detail, the more immersive an experience is. However, VR experiences do not need to be photorealistic to be immersive. Indeed, some of the most popular and immersive VR environments do not attempt to mimic reality by using complex lighting, shading or high-resolution textures, rather they opt for a simple, low-polygon style. Though the future may prove this moot, it is extremely difficult to mimic reality without stepping into the uncanny valley, where an unpleasant impression on the part of the user breaks the immersive experience because realistic characters appear odd or unsettling due to their near-realism (Seyama & Nagayama, 2007).

Low Immersive Capacity

Less immersive experiences offer three degrees of freedom (3DoF), allowing for only the rotation of the user's head to be tracked. In VR, applications that feature limited tracking such as this are often reduced to more passive experiences such as consumption of 360° videos. While this is more immersive than traditional video, it is quite limited when compared to more advanced VR systems. The illusion of presence is broken as soon as a user takes a step in any direction.

Furthermore, applications with low immersive capacity may contain visual elements that are incongruous with immersion. Seyama and Nagayama (2007) note that "the human visual system processes realism and abnormality as separate perceptual dimensions" (p. 349). When abnormal elements stack up, presence may be broken. Physical limitations such as the size of the VR space, unwieldy cables, and uncomfortable equipment may also contribute to low immersion. If spatial boundaries are constantly perceptible, users may feel like they straddle the boundary between the virtual and real world. Discomfort, resulting from unergonomic design or improper fit or adjustment, may also take users out of the virtual world. If a VR application includes a mix of low and high immersive elements, it may be classified as having a medium immersive capacity.

Cognitive Load

Cognitive load refers to the burden placed on the physical and mental capacities of the learner in VR. Cognitive load theory (Sweller, 1988) posits that instructional design can reduce cognitive load by being aware of the limits of working memory. Cognitive load theory divides load into three types for consideration. Chandler and Sweller (1991) define the first type as intrinsic, being the ingrained level of difficulty associated with content. Intrinsic cognitive load is related to linguistic complexity or the need for specific background knowledge to understand the content. Furthermore, as VR is an interactive medium, translating users' physical actions or input into the virtual world, there may be load created by the user interface itself. Without changing the design of the application, there is little that can be done to alter the level of intrinsic load, but educators can be attentive to the other types of cognitive load, extraneous and germane, to mitigate issues created by overloading the working memory of learners. Research into using digital mediums for language learning has shown that cognitive overload is a serious consideration when exposing learners to rich media. Ang, Zaphiris, and Mahmood (2007) posit that managing tasks in digital worlds often results in distraction or failure to prioritize inputs resulting in failure to complete tasks. VR's extremely rich multisensory nature could be a factor in a language learning task that puts additional burden on learners' working memory. However, Armougum, Orriols, Gaston-Belledgare, Joie-La Marle, and Piolino (2019) have stated that there is "no environmental condition effect between virtual and real-life conditions" (p. 9). This assertion validates the utilization of VR in classrooms as it does not increase the cognitive load of a task any more than performing the task in real life.

Extraneous load is generated by the way information and instructions are presented to learners. The quality and presentation of instructions is within the control of the task designer. Furthermore, when completing a task, learners' schema can be drawn upon to reduce the mental resources needed to navigate the task itself. As learners engage in a task, they form new schema, which they automate and apply to the ongoing task. This gradually reduces the amount of working memory needed for the task. As the task becomes automated it is then reclassified as germane load. The process of automation allows for situations where "familiar tasks are performed accurately and fluidly, whereas unfamiliar tasks—that partially require the automated processes—can be learned with maximum efficiency because maximum working memory capacity is available" (Sweller, Van Merriënboer, & Paas, 1998, p. 258). In order to design tasks that allow for automation, careful consideration needs to be given to VR applications. With this in mind, VR applications can be categorized (see Table 2) by the level of demand they place on working memory.

Table 2. Level of cognitive load and indicators

Level	Common indicators of cognitive load
• High	• Requires all mental faculties, usually under pressure • Fully authentic input
• Medium	• Tasks completed at own pace with time to plan, stop and consider • Simultaneous interactions with others within VR and/or real world
• Low	• Scaffolded input for accessibility • Spectator level participation • No interactions with others

High Cognitive Load

Applications distinguished by high cognitive load are often characterized by the way they deal with time constraints. Many applications, especially games, use arbitrary deadlines to create a sense of urgency. If an action or response is not completed in the specified period, failure may be the result. Immediacy is often the defining factor that leads to success. Instructions and input are presented to the user quickly, often without a chance to review or check for understanding. Without proper pacing, even watching a simple video in VR can overwhelm working memory if the content and language are too difficult. For language learners especially, this creates a heavy burden as their language proficiency compounds the difficulty of navigating the VR application.

Additionally, some VR experiences with multiplayer integration may be inherently high load simply due to real interaction with other users. Experiences with high cognitive load generally use so much working memory that it is difficult to communicate, especially in an additional language, while completing a task. In addition, the degree of complexity of the user interface contributes to the load placed on users. If the user constantly needs to think about the placement of their hands on a controller, their working memory is being consumed.

Low Cognitive Load

VR applications that place low cognitive load on users usually fall into two categories: Passive or self-paced experiences. Passive experiences in VR do not put pressure or constraints on the user. Essentially, the user determines how many resources they are dedicating to the experience. However, should this type of experience be prolonged or if the content becomes more complex, cognitive load increases. Self-paced experiences allow users to proceed and engage when they are comfortable doing so. The application itself gives little to no time constraints or strict conditions for progression. Users have time to think, process information, and plan their subsequent interaction. If interaction within the VR application is intuitive and natural, without extra demand being placed on the user to master complex control schemes or intense movements, the cognitive load is low. If a VR application includes a trivial number of factors that contribute to cognitive load, it may fall into a medium cognitive load category.

Purpose

Understanding texts is accomplished by examining them in the context in which they were designed. This is related to genre, which is defined by Swales (1990) as “a class of communicative events, the members of which share some set of communicative purposes” (p. 58). VR applications are designed within a variety of genres, each having “the capacity to deal with only certain aspects of reality . . . each operates within a certain scale of depth and range of treatment” (Feez, Iedema, & White, 2008, p. 52). Each application is designed with a purpose in mind that is central in defining how the application will be used. Accordingly, purpose is an important part of the current framework. While the use may vary from the original developer’s image, it is relatively straightforward to ascertain the purpose of an application by examining the target audience. Bowman and McMahan (2007) comment that “successful applications . . . fulfill requirements in their respective domains” (p. 37). For instance, an application intended for use in schools will need to include appropriate content to meet curricular demands while being targeted at an appropriate age demographic. Many applications are clearly targeted, whereas some applications may appeal in many domains. Though the framework only specifies four purposes (see Table 3), these are not rigid categories, and may be mixed or combined. It is also useful to remember that while an application may be created and marketed for a specific purpose, it may not be used in that manner. For example, the popular VR application *Beat Saber* (*Beat Games*), a rhythm game designed for entertainment, has been used in physical therapy sessions (Torres, 2017).

Table 3. Four purposes of VR applications

Purpose	Types of applications
• Entertain	• Mental or physical challenge, games, movies
• Inform	• Tours, exploration, science
• Communicate	• Chatting, social spaces
• Design	• Creation, design, art, mind maps, memory palaces

Entertain

VR applications designed for entertainment range from video consumption platforms to a wide variety of games. Some of these experiences may be largely passive, while others allow for more active participation. The purpose of entertainment may also be fulfilled in radically different ways. For instance, puzzle-based games entertain quite differently than physical-based challenges, requiring mental resources rather than physical actions or reflexes. The majority of VR applications commercially available fall within this category.

Inform

Another popular subgenre of VR application is designed for learning. These applications feature educational content to inform the user on a variety of topics. This may be accomplished through the use of virtual worlds that allow users to discover new knowledge. Common examples of these kinds of applications include exploratory experiences in places like museums or different geographical locations that learners would not have the opportunity to visit otherwise.

Communicate

Modern headset-based VR offers the unique advantage of allowing users to embody avatars to engage in communicative activities with users in disparate locations. Communicative VR applications allow users to meet in virtual settings and engage in real conversation. VR offers everything from virtual boardrooms to extraterrestrial environments as backdrops for interaction. These include chat applications as well as online social experiences.

Design

Design applications allow users the freedom to create and take ownership of their own ideas. This category is characterized by creative freedom. Design applications generally don't have a defined end state, therefore allowing users to create their own objectives or goals. Most design applications include the ability to share creations to encourage collaboration and feedback. These applications are not limited to art but can also include mind maps and memory palaces (Krokos, Plaisant, & Varshney, 2018).

Communicative Capability

Communicative capability refers to features built into an application that allow users to communicate with each other (see Table 4). It is necessary to consider both internal and external factors when analyzing an application's ability to promote communication. Communicative features may be built into the application or users may communicate directly with people in their immediate real-world environment.

Table 4. Level of communicative capability and indicators

Level	Common indicators of communicative capability
• High	• Synchronous voice and/or text chat • Generally no content filtration (possibility of objectionable content or harassment)
• Medium	• Asynchronous voice and/or text messages • Filtered interactions
• Low	• Solo or offline experience (no communication in VR)

High Communicative Capability

VR applications with high communicative capability generally have synchronous voice chat. These applications allow users to communicate with other users by using a microphone in real time. Some applications may even offer text transcripts of the auditory output. Communication is often as much non-verbal as verbal, so applications that allow users' avatars to emote, or freely use gestures, including hand and body movements, have higher communicative capability. VR is able to mimic real-world communication by combining linguistic output with other visual modes of communication.

Low Communicative Capability

Low communicative capability is characterized by limited or lacking in-application concessions for communication with other players. Many VR applications are designed as single-user experiences, and do not have player-to-player communication built in. This, of course, does not impede the ability of the user to communicate with people in the real world.

Synchronous text-based chat may also be available as a means for communication, though it is less prevalent in VR applications due to the difficulty of typing. A more common method for allowing synchronous text-based chat is through the use of set predefined phrases. These allow for limited expression and exchange of ideas between users. Applications may also be classified as having medium communicative capability.

APPLYING THE FRAMEWORK

Using the *VR Application Analysis Framework*, educators may identify the foundational characteristics of a VR application. With the analysis in hand, educators will be better equipped to successfully implement VR applications in their specific context. If instructors want to apply VR to their lessons, they should start with one or more general curriculum goals in mind and look for VR applications that may assist in meeting these goals. Once a potential application has been identified, instructors should examine its properties through the four lenses to identify considerations that need to be addressed before implementation in the language classroom. The following sections will utilize the above framework to explore representative VR applications. These examples will demonstrate how popular commercial off-the-shelf applications can be analyzed for use in a classroom setting.

Analysis of *Spotlight Stories* [*Google*, 2016]

Spotlight Stories' (found at https://atap.google.com/spotlight-stories/) purpose is to entertain. Entertainment applications are typically the most popular form of VR experience. *Spotlight Stories* (available on *Daydream*, *Oculus*, *SteamVR*, *Quest*, and *Windows Mixed Reality*) is a series of high quality 360° stereoscopic short films produced by the Advanced Technology and Projects group, a research and development division of *Google*. Users select a video and watch the film, while participating actively by turning their heads and bodies in full 360° motion to follow the content. In some cases, the users' active participation influences the outcome of the narrative. This requires users to remain more focused and invested in the content than a typical 360° video. Most of the videos have no speech, instead relying on music and action to convey their stories.

Spotlight Stories' immersive capacity would be classified as medium. Its physical immersion through interaction is limited. Many of the videos feature no interaction other than requiring users to turn on the spot to keep up with the story, while others feature small measures of interaction by waiting for the user to face a certain direction before continuing. Primarily the immersion is provided both through the stereoscopic depth provided by the 3D videos, which provide better immersive experience over monoscopic 2D videos by placing users in the scene rather than surrounding them by a 360° film screen. However, due to the nature of film, there is no position tracking possible, meaning immersion can be broken if users attempt to move towards any of the objects present around them. VR headsets with tethered cables may break immersions for users when they turn 360 degrees.

It would be categorized as low cognitive load within the framework. Typically, 360° videos are non-interactive experiences, and while many of the *Spotlight Stories* are non-interactive, a number of them do require users to look in particular directions before continuing the content of the videos. This can result in increased germane load, requiring some additional active focus by viewers compared to a standard non-interactive video. Additionally, while the characters in many of the videos communicate without speech, some videos do feature spoken communication. There are differing levels of intrinsic load that may reduce users' ability to effectively understand the video content.

Furthermore, *Spotlight Stories* does not feature any shared video watching capabilities, meaning users watch the videos alone without the opportunity to communicate with others in-application. Thus, it is considered low in terms of communicative capability.

Example Classroom Implementation

As with many 360° video experiences, activities aimed at communicating content to others that are unable to see the videos themselves are appropriate. Teachers may ask one VR user to describe the content of the video in real-time to other students who take notes. Such notes could include an outline of the plot, specific events, and character names and descriptions. The notes could be used for a variety of tasks including summaries and information gap activities. Students could also reconstruct the video in comic form, before finally comparing the comic with the original video to reflect on the differences and what possible communication breakdowns caused them.

Analysis of *Anne Frank House VR* **[***Force Field***, 2018]**

The purpose of *Anne Frank House VR* (found at https://annefrankhousevr.com/) is to inform. Informative applications are focused on educating users about specific content. *Anne Frank House VR* (available on all *Oculus* platforms) uses VR to immerse users in a historically rich recreation of the past. This application is a virtual tour experience of the hidden annex that Anne Frank resided in during World War II. The visually appealing and thought-provoking tour is a linear path through the dwelling accompanied with an easy to understand auditory narrative. The experience will take learners between 15 to 30 minutes to complete.

The immersive capacity is medium. All the assets are realistic and well modelled, creating a strong sense of presence in the scene. Immersion is enhanced with high quality spatial audio. Users can hear bombers flying overhead and also hear ambient sounds through the walls. However, the illusion of presence is broken because there are very few items users can interact with, though the environments are rich with detailed objects that almost ask to be manipulated. Users' inability to affect the environment in natural ways dampens the immersion level, in an otherwise highly immersive virtual environment.

Anne Frank House VR's cognitive load would be classified as medium. After the users listen to the narrative, they are given time to explore the space and are not pushed forward. However, the slow-paced narrative does not repeat, which demands the learners comprehend the information the first time it is delivered. The subject matter is also highly emotionally impactful, which would mean it has a high intrinsic cognitive load.

The application is a completely single player experience, with low communicative capability. There are no options for interaction with other users through synchronous or asynchronous in-application text or voice. There are no characters to interact with and the user solely listens to a narrator's voice as they proceed through the experience.

Example Classroom Implementation

It is suggested that *Anne Frank House VR* be scaffolded by pre-reading or post-reading tasks in conjunction with the book, *Anne Frank's the Diary of a Young Girl.* These activities may consist of language focused tasks, schemata building explorations into the historical context of the narrative, and the connection of narrative to current world events. While immersed in the VR experience, there is a low communicative capability so to facilitate communication, learners can complete activities such as relaying what they are seeing in each room, retelling what the narrator has said or summarizing the events that were described. The content is quite complex and emotionally taxing, hence students need proper scaffolding to feel the full impact of the Frank family's experience. Once they have had this experience, students can then write a journal reflecting on their emotional journey through the house.

Analysis of *REC Room* [*Against Gravity Corp*, 2016]

REC Room (found at https://recroom.com/rec-room) is an application designed with the purpose to communicate. Communicative applications are more verbally demanding and often deal with authentic language input and output. *Rec Room* (available on *SteamVR, Oculus Rift* & *Quest)* is a free multiplayer communal space for people from around the world to meet up and take part in shared activities. Users can customize their own avatars and individual spaces, while also interacting with other users in a central hub. Furthermore, they may take part in a variety of multiplayer activities and games.

The application's immersive capacity is medium. The vibrantly colored cartoon-like environments and floating body avatars are visually consistent, aiding in immersion. Almost all the assets can be manipulated and users have freedom of movement, which can add to the feeling of being present in an environment. However, this is often broken by unnatural movements such as teleportation and slight visual aberrations caused by low-quality user generated content.

In this environment, users engage with people from a wide range of backgrounds, making the intrinsic cognitive load high. There is a likelihood users will encounter unscripted situations in which they have little time to react. There is also the pressure of authentic linguistic interactions, which may increase anxiety. The application does not contain accessibility features to help scaffold language input, such as automatic transcription, so users do not receive support to help them navigate the communicative experience. Additionally, some of the activities or games are highly dependent on task completion within a specific time frame, adding more cognitive demand on users.

Rec Room has a high communicative capability including synchronous voice chat enhanced by gestures, emotes and text. This application is very similar to interactions in the real world as conversations, topics, and actions of others can be unpredictable. A common problem with virtual worlds, like Rec Room, is that there is a potential of harassment and users need to know how to navigate these kinds of situations. In applications like *REC Room,* women, LGBT+ individuals, and other players have been subjected to targeted harassment campaigns (Chess & Shaw, 2015). The failure of major commercial publishers and developers to police their interactive spaces (Webber, 2014) leaves players, learners, and their teachers to navigate these sometimes perilous environments.

Example Classroom Implementation

This application is a great way for language learners to employ the skills they have been learning in class with an authentic audience. This is possible because the high communicative capability allows for real world language usage. Learners can enter this environment with a language point to practice in a conversation with speakers from various backgrounds or could collect data for a project. However, teachers must take the steps to familiarize themselves with tools for muting, blocking, and reporting other users to prepare themselves and their students for the possibility of harassment. Also, prior instruction in pragmatics and register-specific language should be carried out in order to maximize beneficial interaction and minimize problematic exchanges.

Analysis of *Tilt Brush* [*Google*, 2016]

Tilt Brush (found at https://www.tiltbrush.com/) (available on *Oculus Rift* and *Quest*, *SteamVR*, and *Windows Mixed Reality*) is an example of a design application. Applications with the purpose of design have no overt objectives or extrinsic goals defined by the application itself; rather, the user has free rein to use the tools provided in the way they deem best. In *Tilt Brush,* users select a world theme, and are given a virtual palette housing a variety of shapes and tools. Users can paint and manipulate objects in an immersive space and are free to view their creations from any angle. Users can also view other users' creations that have been uploaded to *Google's* servers.

Tilt Brush has clean, vibrant visuals that aid in creating a space with high immersive capacity. Controls and interaction are natural, intuitive, and well designed for the creative task. The user's dominant hand is used to create content in the 3D space, while the other hand is used to hold an approximation of an artist's palette for selecting brushes, colors, and materials. Users remain largely in one area, with all motion in the real world being mirrored within VR, limiting the virtual space to the boundaries of the actual physical space they occupy. In this way, the likelihood of motion sickness is minimalized.

The design of *Tilt Brush* focuses on simplicity and usability, resulting in an application with low cognitive load. As such, the controls are intuitive, not adding substantial cognitive load as users struggle to learn how to interact in the application. Effectively, the germane load is reduced by allowing users to interact by using natural gestures to control the application. As the application is open-ended, there are no time constraints, tasks, or instructions that would increase users' extraneous load. *Tilt Brush* allows users to decide how much of their cognitive resources to commit to the task at hand.

Tilt Brush allows users to be highly creative and express themselves through images and painted words. It does not, however, have any communicative features such as text or voice chat built in so its communicative capability is low. While users can download and view the creations of others via the gallery feature, there are no multiplayer options allowing for multiple users to view creations together or leave comments for other users to see.

Example Classroom Implementation

Though the cognitive load is rather low, teachers can reduce it further by allowing students to experiment with the application prior to the actual task in VR. Once acclimated to the features of the application, students could recreate a 3D scene from a book they are reading and have other students visit the scene and comment on its features. Alternatively, by broadcasting the VR image via a projector, students can take their classmates on a tour of their creations while explaining the scene from the story. This would enhance the communicative capability of the application. Students could also work together to create procedural texts providing instructions to a VR user to create a specific piece of art.

DISCUSSION

VR has the potential to transform language learning experiences, but like all new technologies, needs concerted effort for instructors to use correctly. Best practices associated with the use of technology in the classroom can and should be applied to VR. These practices include proper scaffolding of activities and technology, accounting for learners with different abilities, and preparing non-VR tasks as a part of activities. However, total reliance on past principles and frameworks for the implementation of new technologies will lead to practices inadequate for the unique aspects of VR. Hence, *the VR Application Analysis Framework* builds upon past research while highlighting the unique features and aspects that make VR different from past classroom technologies. The framework provides the criteria educators need to complete needs analysis of VR applications before they bring VR into the classroom. With proper preparation, educators can use VR to provide rich, memorable, and instructive experiences. As with any authentic content brought into the classroom, adequate scaffolding is necessary to “present the learner with just the right challenge” (Clark & Graves, 2005, p. 571) while meeting learning objectives. Scaffolding is most effective when holistic consideration is given to target text, and new electronic resources are no exception. Robin (2007) notes that “effective users of raw electronic resources . . . will bring a wider variety of input at the proper level for a broader range of learning styles than could possibly be made available in any pre-packaged closed-track program” (p. 109). New technologies can be difficult to implement successfully in the classroom, but when integrated thoughtfully, expand the possibilities for learning. In the case of VR, proper analysis of the purpose, immersive capacity, cognitive load, and communicative capability will help educators make better decisions about the use of VR in their classrooms.

The framework presented in this chapter is targeted at any educator who has an interest in or curiosity about VR and wonders if it can be used in language learning classes. The framework aids in assessing whether VR is suitable for the learning context and highlights what information educators need to know how to make effective use of it. Any new technology will appear daunting to the uninitiated, but the barriers to use can be lowered by increased familiarity through study. As VR finds its way into the hands of even more mainstream educators and students, it will become markedly easier to apply to language education. In essence, the framework will make using VR in a language classroom less daunting than it otherwise could be.

The number of commercial off-the-shelf (COTS) VR applications are increasing daily. Applications that were only concepts in the past have now become a reality. The framework presented here provides the flexibility to assess almost any VR application in any genre, while providing for new genres not yet imagined. The video game industry has matured and “almost all [digital game] genres known today already existed in a prototypical form in the early 1980s" (Malliet & de Meyer, 2005, p. 25). VR developers are exploring new genres unique to the medium itself. Different genres of applications could aid learners in gaining a wider understanding of multiple contexts and enrich language learning. COTS applications, while typically not designed for language learning, deliver rich experiences that leverage the immersive capacity of VR. These experiences can be adapted into language learning experiences with careful scaffolding, allowing educators to have access to a plethora of options for use in their classrooms. This choice of high-quality well-crafted VR experiences can be overwhelming, but by applying the *VR Application Analysis Framework,* educators are more likely to find VR content that fits within their specific contexts.

While it is impossible to predict the future state of VR with absolute certainty, one may assume that the technology will improve to a degree that renders some aspects of the framework irrelevant. With this in mind, *the VR Application Analysis Framework* has been kept intentionally mutable and adaptable to unforeseen changes to the VR landscape. For instance, if future VR technology is built into eyeglasses, the change in physical form factor will not render any part of the framework irrelevant, rather such a change would allow for a VR experience to achieve a higher level of immersive capacity than previously possible. In this manner, the framework does not instantly become outdated as do many projects involving the latest technologies.

LIMITATIONS

First, as is a risk when developing any framework, it is not possible to predict 100% of its usage cases. There may be outlying applications that do not match the *VR Application Analysis Framework* even though it has been left open for flexible use within the language classroom. As emphasized earlier in the chapter, software developers are not typically developing applications to be used explicitly for language learning. While the framework has been intentionally designed to encompass many different applications, future software may not fit within the defined framework criteria. Hence, the framework may need updating to integrate emergent factors and genres as the technology continues to develop.

Furthermore, while the framework focuses on four areas for analysis, it does not offer suggestions on exactly how the analysis needs to be applied in classroom contexts. With analysis in hand, educators should have a clear idea of what they need to consider before using VR language education. However, there is often a gap between knowledge and how it will be applied. The framework does not offer comprehensive step-by-step instructions for using specific VR applications. In addition, even if all of the lenses of the framework are applied correctly to analyze a VR application, there is no guarantee that the analysis will lead to a successful lesson. There are too many context-specific variables in every educational environment to suppose the framework can account for all of them. This could partially be addressed in follow-up publications elucidating how to apply the framework to specific classroom contexts.

There are also limitations inherent in the use of VR within the classroom itself. Among the most pressing is access to VR technology. Though the equipment is becoming more affordable, it is still a financial strain for some institutions. This means that with large groups of students, there can only be a limited number of VR participants. Therefore, teachers need to prepare lessons that allow for non-VR participation in some way (Bonner & Murphy, 2018). Technology can also be unpredictable and may malfunction, so teachers should prepare a non-VR alternative lesson plan, which can be time consuming. Another consideration that instructors should be aware of is that students may have emotional and/

or physical limitations that limit their participation in a VR lesson. Students in this situation will need a non-VR related role to allow them to participate.

CONCLUSION

Future Directions

The *VR Application Analysis Framework* is a starting point to assess VR applications for implementation in the classroom. This theoretical framework, backed by pedagogical theory, requires further testing with more applications to ascertain how best to apply the model to different contexts. Once this has been achieved, data will indicate the robustness of the framework itself. The framework provides the basic information necessary for classroom application, however, it does not directly provide activities or task creation instruction. The next step is to build a compendium of VR applications and applicable communicative activities so that teachers better understand how VR can be applied to their language learning context in a sound, pedagogical manner.

In addition, this framework need not be limited to teachers and classroom activities. It may be possible to provide additional scaffolding to the framework to inform language learners themselves on how best to apply VR applications for their own independent study and practice. If the students themselves are better equipped to manage VR's affordances and limitations for their own educational benefit, then VR can become a powerful tool in creating autonomous, self-directed learners.

Finally, language educators should take a more active role in the development of language-focused VR applications. Steuer (1992) described the need for applied linguists to be involved in the VR content creation process:

> *Communication researchers are uniquely suited to VR research; they can build upon the lessons learned from earlier studies of media technologies in a human context, extending the work to include new media as they develop. Rather than relying solely on engineering disciplines to design and implement new media, communication researchers should become involved in the design and implementation of new media systems before they are institutionalized. (p. 91)*

If educators can provide VR developers with more frameworks that aid them in the development of content based on sound pedagogical theory, then VR developers will in turn provide teachers and students with greater language learning opportunities and affordances.

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KEY TERMS AND DEFINITIONS

Cognitive Load: The amount of working memory which is required to perform a task adequately at a given time.

Communicative Capability: The degree to which communication can be facilitated.

Flow: The sense of heightened immersion which results in extremely high performance of tasks. Within software applications, this results from changing elements of an in-app task from requiring working memory to automation, thereby decreasing overall cognitive load.

Immersion: The sense on the part of the user of being 'in' the VR application or digital game, when the user's physical reality is supplanted by the virtual or digital application.

Immersive Capacity: The degree to which a digital game or VR application can engage the user.

Presence: The sense of believing the digital assets of a VR application are real, by being able to interact with them almost as if they are real.

Purpose: The mode of play and/or the genre of the VR application or digital game.

Spatial Computing: Any modes of computer interaction that involve use of the physical space around the user, whether supplanting the space via virtual reality, or altering it via augmented reality.

Virtual Reality: The replacement of one's physical environment with an immersive digital world via a computer screen or head mounted display (HMD). However, since the advent of modern VR headsets in 2012, the term now commonly refers only to the use of HMDs.

Chapter 3

The Case for Qualitative Research Into Language Learning in Virtual Worlds

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ABSTRACT

This chapter reviews some of the most common research approaches used in investigating language learning and teaching in virtual worlds. In particular, the author makes the case for qualitative research approaches to the investigation of language learning and teaching in virtual worlds. The highly representational and immersive nature of online environments such as virtual worlds demands that researchers pay specific attention to the quality of teacher and learner experience and to individual reactions to the visual and kinesthetic stimuli of the environment. The chapter discusses some of the advantages of qualitative practitioner research in relation to the specific nature of virtual world contexts for language learning.

INTRODUCTION

Virtual worlds are generally understood within the recent computer assisted language learning (CALL) literature as 3D computer renderings and have been a recognised platform for language learning and teaching for nearly 20 years, in particular within the context of synchronous computer mediated communication (CMC) often also referred to as CMCL (computer mediated communication in language learning and teaching). The main affordances for language learning and teaching are generally considered to be the use of avatars for student-teacher and student-student synchronous interactions and the rich visual environment which can be tailored to recreate infinite contexts for language learning scenarios and simulations. Without doubt, the potential for interaction with objects and educational artefacts - in addition to avatar movement within the virtual space - have made virtual worlds particularly appealing to educators and users who place value on *immersiveness* in online education. Recent technological developments in the field also include the use of virtual reality headsets such as *Google Oculus* which

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have the potential to impact on the perception of immersiveness in ways that are yet to be investigated. Though initial in-world (i.e., in the virtual world platform) communication among teachers and learners was limited to text-based chat, the addition and adoption of voice-chat undoubtedly made virtual world platforms increasingly attractive for language education within CALL. Last but not least, while the body of virtual world research literature within CMCL generally focuses on language learning in formal educational contexts, often as part of formalized online language exchanges between two or more educational institutions, one also needs to bear in mind that virtual worlds are also used within the context of informal and incidental language learning which has been documented in particular in online 3D gaming platforms such as *World of Warcraft* and massively multiplayer online games (MMOGs) in general.

The aim of this chapter is two-fold. Firstly, it aims to provide an up-to-date overview of the virtual world research literature within CALL, in particular in terms of the research foci and the methodological approaches adopted by researchers to date. In addition, it is a first attempt to discuss the rationale for many of the research decisions that have created the predominantly qualitative research landscape that emerges from the review itself. In particular, this chapter aims to provide a discussion not only of what we have done as a virtual world research community but also of the *why*. Indeed, research decisions do not come from nowhere. Thus, this chapter is an attempt to “go behind the scenes” of virtual research within CALL in order to provide our community with greater insight and critical awareness into what has been achieved so far and why qualitative research continues to be a valid research option. In addition, this chapter is an attempt to clarify our contribution to the CALL research landscape not only in terms of our output (i.e., our research outcomes) but also in terms of our input – who we are and what we bring to the research context as researchers. In the tradition of qualitative research, this chapter is an attempt to include ourselves - the research community - as an integral part of both the research landscape and findings. Finally, this attempt at *making sense* of what we have done as a virtual world research community in CALL over the last 15 years can also be understood as a way of opening up our thinking as a community to wider scrutiny and debate in the interest of the validity of our research on the one hand, and future research decisions and directions on the other. This need to be “making sense” is also echoed in a recent review of the CALL landscape by Blin. She writes (2019):

> *CALL research is no longer only about searching for and studying applications of the computer in language teaching and learning. It is also about making sense of the way we inhabit digital spaces through language, about making sense of the way we construct and expose our digital identity in different languages. It is also about the way we communicate and make meaning across multiple spaces, time, and cultures. It is about understanding and critically engaging with different world views. (Blin, 2019, p. 4)*

This chapter is divided into three main sections. The first section provides the backdrop against which research into language learning and teaching has generally been carried out. It offers an initial discussion of how the context and the medium impact on specific research decisions that have often determined methodological choices and approaches. The second section, provides an up-to-date overview of the research focus into *learner interaction* within the context of language learning and teaching in virtual worlds, and a discussion of the most common research approaches used by the virtual world research community within CALL and the development of these approaches over time. The third section analyses in greater detail some of the research into the most common affordances which have, over the years, attracted both researchers and teachers to this particular medium.

THE NATURE AND CONTEXT OF VIRTUAL WORLD RESEARCH

The CALL literature on virtual worlds for language learning can be generally divided into two main categories: literature which focuses mainly on the description of the affordances and potential for language education of the virtual world platforms and literature which attempts to evaluate and analyze language learning and teaching in-world within the research traditions of CALL. In addition and in line with a significant proportion of CALL research, a considerable amount of literature on virtual worlds and language learning over the years has been - and continuous to be - practitioner-researcher based where teachers and educational specialists have attempted to make sense of the learning experience for learners as they themselves came to terms over time with the potential and complexity of virtual world environments for teaching. Indeed, as a virtual world researcher-practitioner myself (Deutschmann & Panichi, 2009a; Panichi, 2015b) and as one of pioneer teacher-researchers into the platforms at the time voice-chat was being introduced, I have, over the years, experimented with different practitioner research approaches including action research, reflective practice and exploratory practice (EP), a protocol I have found particularly useful in capturing both teacher and learner concurrent "learning" within the platform.

Finally, because virtual world platforms started off as a niche educational interest within CALL and have continued to be developed within and by a considerably small community within CMCL – for a number of reasons that go beyond the scope of this chapter – one will often find that even in some of the major research studies, a considerable amount of time and space is often devoted to the description of the platforms in an attempt to provide the novice practitioner-researcher (novice in terms of their knowledge about virtual world platforms) with sufficient technical information about the CMCL research context. Furthermore, of the combined total of 30 publications recently reviewed in Peterson (2016) and Sadler (2017), all of them are small scale teacher-researcher based with limited number of participants (from under 10 to a maximum of 50 in some instances) and data collection is in general carried out only for the duration of the in-world language course. The studies make use of some of the most common qualitative research approaches such as collection of learner feedback via questionnaires, interviews, teacher observations, chat transcripts and recordings or the virtual world sessions. In some cases, the studies make use of what is defined as "mixed-methods" approaches where qualitative data collected from interviews, for example, is analyzed both qualitatively, through discourse analysis, and quantitatively via the measurement of certain instances or episodes of learner interaction in-world. In a few instances, researchers applied statistical analysis to the data collected. A small percentage of the studies are longitudinal in the sense that the data collection spanned over a period of at least one year.

In view of what has been discussed so far, i.e. that most of the virtual world research to date in CMCL is teacher-researcher based and that rich descriptions of the environment and its features are usually considered to be highly relevant in contextualizing the research itself, it comes as no surprise that most research into virtual worlds for language education, is, to date, qualitative in its general approach. Furthermore, as most research focuses on formal language teaching and learning scenarios of some sort where student numbers tend to be small both out of necessity (the environment is notoriously complex to manage with large numbers of students) and as a result of current dominant language teaching methodology such as communicative language teaching. Indeed, where verbal interaction between participants is considered a priority (and difficult to manage with large numbers of learners), the use of quantitative research that attempts to measure the behaviour of large numbers of students does not really make sense. A further and final justification for the continued use of qualitative and small-scale approaches into virtual worlds within CMCL also lies in the focus of much of the research itself. Indeed, a significant part of the research literature has focused on the theme of *interaction* and in-world participation where particular attention is paid to the detailed description of interaction episodes, both in terms of text-chat, voice-chat, avatar movement and activity, the use of the environment in supporting interaction, learner strategies, learner emotional reaction to the environments (affect), motivation, teacher intervention, task design and collaboration. In this research, the emphasis is on determining how interaction takes place in the virtual world environment, on documenting the quality of the experience both for teachers and learners and validating the teaching methodology, that is, how we are making use of the environment for language education.

In addition to the above, one also needs to bear in mind the challenges involved when carrying out virtual world research and collecting data in-world compared to other online platforms such as the ethical issues surrounding avatar identity and the recording of virtual world data. As practitioner research continued to develop, one of the research needs that was identified within the CALL community was for more systematic and theoretically framed research projects (Chapelle, 2010; Deutschmann & Panichi, 2013). And, in an attempt to go beyond the practitioner-researcher approach yet without renouncing their practitioner researcher background, several researchers and developer groups went on to devote considerable time and energy to addressing this call. Wigham (2012), for example, developed a much needed and robust multimodality framework in her work on the interplay between verbal and non-verbal activity in virtual worlds, Panichi (2015b) combined an exploratory research lens with case study research and reflexivity in providing a thorough examination of learner participation in virtual worlds while Nocchi (2017) applied activity theory to generate a detailed analysis of a 4 year language programme in a virtual world. Wang's (2017) study looked at learner participation and verbal interaction using a combination of activity theory, conversation and discourse analysis.

In a recent publication, Peterson (2016) argues for the need for more quantitative research into CMCL in virtual worlds on the grounds that a significant amount of qualitative research has already been carried out and that qualitative findings now need to be generated that will enable us, as a research community, to extend the validity of our initial findings by increasing their generalisability. While recognizing the legitimacy of Peterson's claim (generalisability is always a beneficial outcome), the aim of this chapter is, nevertheless, to make the case for ongoing qualitative research into language learning and teaching within virtual worlds not because we like it (we do!) but because, ultimately, it continues to make sense. I will attempt to do so by providing a critical appraisal of the topics explored by researchers to date and the context of their research. The thrust of my argument is that qualitative and quantitative research should not be discussed as one against the other but rather as complementary approaches which make use of different tools in support of our research questions. I would like to argue that our research questions are intimately and legitimately connected to the contexts within which we operate and to the knowledge development we perceive as priority within these contexts. I would like, thus, to shift the focus of the debate to a discussion of how we can best serve our research needs (what we need to know to move forward) rather than the needs of research.

While it is certainly true that large-scale quantitative research is lacking within the virtual world literature in CALL, this needs to be nevertheless weighed against ongoing teacher-researcher-developer needs to explore platforms as the technology develops so that we are able to provide students with state-of-the art learning environments. And, just as above I pointed out how virtual world research in CALL is predominantly practitioner based, we also need to bear in mind that many of us are often also developers, not only of the lesson and linguistic material that we provide our students with but also of the 3D environments we use for our teaching. Many practitioners within the community are indeed developers in the sense that they are *3D builders* and have, over the years, created, or rather "scripted," numerous and exquisite open-access interactive 3D environments for language learning often from scratch and for free. In particular, if one considers the impact in terms of the quality linguistic and cultural knowledge that is being made accessible and constantly validated though practitioner qualitative research, it can be argued that the need for quantitative results may be less urgent than recently suggested. Significant pedagogic development has also been carried out by fellow practitioners and researchers in-world for heritage languages, of which North Sami is just but one example (Deutschmann, Outakoski, Panichi, & Schneider, 2010; Outakoski, 2014). If one considers the importance and the urgency of providing remote communities with quality materials for the learning of heritage languages that risk disappearing, we may want to be excused for not prioritizing the generalisability of our research. Indeed, and to conclude this first section, I would argue that the exploration of new contexts should actually be considered best practice and should never be put on hold as it provides us with a constant stimulus for thinking about what we are doing. Furthermore, as we develop an understanding of what works and what doesn't work, we are also arguably contributing to the emergence of understandings about language learning and teaching in general which may have implications for the broader field of language education to which CALL research belongs (Panichi, 2012; 2015a).

Finally, in support of my stance, I would like to argue that highly representational and immersive online environments such as virtual worlds demand that researchers pay specific attention to the *quality of teacher and learner experience* and to *individual reactions* to the visual and kinesthetic stimuli of the environment. In order to do justice to the specific nature of the environment and to the affordances for language education that it provides, I propose that we are in need of research approaches that are specifically geared to capture the quality and the complexity of learner interactions at the heart of virtual world language learning contexts (Wigham, Panichi, Nocchi, & Sadler, 2018; Panichi, 2015b). In a recent call for more qualitative research within CALL itself, Levy and Moore (2018) discuss the need for research that is exploratory in nature especially when attempting to uncover emergent phenomena. In particular, they underline how in CMC environments "qualitative research provides the tools for a deep description of a process as it unfolds" (2018, p.5) where the circumstances of the interactions are fluid, unpredictable and emergent. In addition, it needs to be pointed out that the speed of developments and the time and energy involved in carrying out research as researcher-practitioners tend to lead us to carrying out small scale qualitative rather than quantitative research. And, at the end of the day, our research inevitably reflects the general conditions in which we operate.

Research Foci and Approaches

The following is a review of the CALL virtual world literature on learner interaction and includes some of the initial research carried out in 2D virtual worlds before voice-chat functions were enabled. The aim of this section is to highlight both the foci of the studies and illustrate some of the different research approaches within the general qualitative and practitioner-researcher paradigm. Some of these studies were exploratory and made use explicitly of exploratory research approaches (Peterson 2010) while others were less so (Sykes, 2005; 2009) or took a specific and focussed look at a clearly identified area or topic in relation to learner interactions. For example, Schweinhorst (2004; 2009) and Shield, Davies and Weininger (2000) examined the role of virtual worlds in relation to learner autonomy; Shield (2003) discussed the emergence of oral discourse in written format; Zheng, Young, Wagner and Brewer (2009) discussed learner Negotiation for Action within virtual world language learning tasks; Sykes (2005;

2009) discussed the relationship between the platform and learner pragmatics; Kuriscak and Luke (2009) explored learner attitudes to virtual worlds for language learning. In addition, all of these studies, with the exception of Sykes (2005; 2009), discussed learner interaction in text-based communication only, limiting the analysis of interaction to one mode of communication. Moreover, Kuriscak and Luke (2009) did not include data from the virtual world platform at all in their analysis. Peterson's work on learner participation strategies (2010) is particularly relevant to understanding learner interaction though it was also limited to data from text-based chat logs. Indeed, even though VoIP (Voice over Internet Protocols) had been available for use with virtual world platforms at least since around 2003 and integrated into some virtual world platforms themselves such *Second Life* in 2007, the bulk of research into virtual worlds available at the time within CMCL continued to focus mainly on the use of text-based chat in learner interactions.

The reasons why many researchers continued to focus on text-based learner interactions despite the availability of voice-chat can only be speculated upon. One possibility is that voice protocols add a layer of complexity to the running of educational events within virtual worlds. It may be the case that in many educational contexts, text-based interaction is easier to manage in view of the type and amount of technical support required. It can thus be argued that the researcher's focus is often limited by what is more practical to capture. However as of 2010, studies started to appear that looked at language learner interaction in virtual worlds from a multimodal perspective as well. Some studies in fact looked at the combination of student interaction in the environment both in terms of written and oral communication (Canto, Jauregi & van den Bergh, 2013; Deutschmann, Molka-Danielesen, & Panichi, 2011; Jauregi, Canto, de Graaff, Koenraad, & Moonen, 2011; Wang, Deutschmann, & Steinvall, 2013), while some continued to focus on text-chat only (Peterson 2011; 2012a; 2012b). However, none of these studies expanded on the existing research approaches in any way. They either focussed on a discussion of learner interaction within the communicative channels with which we were already acquainted such as voice and text based chat (Canto et al., 2013; Peterson 2011; 2012a; 2012b; Wang et al., 2013) or used an experimental and control approach to examining the phenomenon of learner interaction (Canto et al., 2013) which arguably did not allow for an exploration of the issues. Deutschmann et al., (2011) used an activity theory framework which, while broader in its general research approach, was focussed more on describing the technicalities of telecollaboration than exploring the notion of learner interaction and participation in any way. The most innovative research to be published at the time was the study by Wigham and Chanier (2013). In this study, the authors take a more comprehensive look at communication in the virtual world in an attempt to broaden our view of what was going on and provide, for the first time in the virtual world literature within CMCL, a discussion of *multimodality* in virtual worlds understood as a combination of both learner verbal (text-based and voice-based communication) and non-verbal communication such as through avatar appearance, proxemics (orientation in the three dimensional space) and kinesics (gaze, posture, gestures). Similarly, Panichi (2015b) provided a broader understanding of interaction and learner participation by using a qualitative case study research approach and visualisation based on direct observation and interpretation as the primary analytical tool for the visual data. According to Panichi (2015b, p. 328), learner participation in virtual worlds is to be understood as *verbal and intentional and contextualised non-verbal activity*. This is in line with Wigham's (2012) distinction between verbal and non-verbal interaction in virtual worlds where she makes use of a learner corpus of verbal and non-verbal acts achieved through a discourse analysis approach. The similarity of the reciprocal findings of Panichi (2015b) and Wigham (2012) is all the more significant as they were reached by using different methodological approaches.

A more recent study is Nocchi's (2017) systematic analysis of the affordances of virtual worlds for foreign language learning through an activity theory framework. Nocchi uses language tasks as the unit of analysis and identifies instances of task disruption. The study examines the cause of the disruptions in each episode and the actions taken by the participants to resolve them thus providing insight into the participants' role and their use of the medium with particular emphasis on its technical and social affordances. Of particular significance to the field is Hartwick's (2018) discussion of interaction in virtual worlds which draws on classroom interaction research thereby substantially enriching the theoretical framework of reference for future researchers. Finally, there are a number of recent studies that build on many of the previous work reviewed in this section both in terms of the methodology employed and their foci. For example, Palomeque and Pujolà (2018) adopt a social semiotic approach to studying communication by creating a multilayered transcription method to account for the multimodal nature of interactions in virtual worlds and to describe how different communication modes or channels are used in combination by participants to create meaning in-world. Park (2018) examines cognitive and metacognitive strategies in simulation tasks for the virtual training of military air traffic controllers in South Korea. Yamazaki (2018) combines the instructional approach of computer-assisted learning of communication (CALC) with a mixed-methods case study approach to investigate participants' natural acquisition of Japanese in a 3D virtual environment. In analysing whether foreign language virtual world interaction is beneficial for learners that present a specific personality profile, Melchor-Couto (2018) explores various facets of affective interaction in the virtual world, ranging from how the anonymity afforded by the environment interacts with the language learners' personality profile to how the perception of anonymity interacts with the learner's foreign language anxiety (FLA) profile and self-efficacy beliefs.

Research Into Affordances for Language Learning

The discussion in this section is informed mainly by literature from CMCL and, where relevant, by debate in the general virtual world literature in the fields of education and educational technology. The discussion is informed by research and studies that look at learner participation in the environment in terms of linguistic interaction on the one hand and in terms of learner activity and learner affect on the other. In addition, there are also a certain number of studies that discuss learner participation and interaction in the environment from the point of view of task design.

Panichi, Deutschmann and Molka-Danielsen (2010) discuss language learning in virtual worlds from an ecological perspective according to which the learner interacts not only through the environment but becomes part of the environment. The ecological model sees systems as open, complex and adaptive, comprising elements that are dynamic and interdependent. According to this model, all learning is situated in an environment and is as such contextualised. In this view of learning, for example, the learner is not only part of the environment but also one of the variables in determining subject matter (the target language content) and the outcome of learning and teaching. In an ecological perspective, and in line with sociocultural theory, people and the learning community are also constituent features of the environment and levels of engagement are dependent upon meaningful participation in human events involving perception, action and joint construction of meaning. Furthermore, in collaborative learning setups as in the case of the communicative language teaching approaches, communication skills are of primary importance and central to engagement. The authors suggest that, in highly complex communicative environments such as virtual worlds, learners need to be equipped not only with the technical but also the participatory communicative skills – be they social, linguistic, pragmatic and/or intercultural – so that they may engage more effectively with the specific environment. As part of this argument, the authors (2010, pp. 174-176) identify four key affordances of the virtual world of *Second Life* that may have an impact on participation and collaborative language learning. They are: "sense of place" discussed as the user's perception of the 3D environment, collaborative building features, openness of the world to other users and representation of self via an avatar. All of these virtual world characteristics offer significant language and intercultural learning opportunities to the foreign language student.

Learner Activity

Some of the literature describes learner participation in terms of activity within the virtual world (Panichi, 2015b). According to this review, learners participate in virtual world learning activities through:

- exploration
- experimenting
- experiencing
- searching for information
- belonging
- collaboration
- social interaction and communication
- being (learning that results from exploration of self and identity)
- building
- championing (i.e. promotion of real life causes such as charities)
- expressing (communicating about virtual world experiences outside of the virtual world platform)
- doing
- sharing
- acting, performing, role play and story telling
- playing and games
- problem solving

Immersiveness

Building on his previous studies, Schwienhorst (2009) discusses the contribution of virtual world environments to learner autonomy, reflection, and authentic communication concluding that the immersiveness of the 3D environment has a positive impact on learner interaction in the target language. Two key affordances of the environment according to the author (2009) are the use of avatars which allow for identity expression which can be linked to both in-world and out-of-world identity and the flexibility of the space which allows for experimentation with learning scenarios which are not possible in face-to-face educational contexts. In his 2004 study, he examines students' use of indexical language (such as the use of "here"), for example, as an indication of a heightened sense of presence and co-presence compared to non-3D environments for online learning. Schwienhorst argues (2009) thus for further research into mapping of cognitive and meta-cognitive activity triggered by this sense of presence in the environment as a result of immersiveness.

Another study that highlights the role of immersiveness and cognitive development or higher order thinking skills (HOTs) in relation to language development is Leong's (2011) study of Chinese as a mother tongue language in Singapore. In designing the tasks and to ensure deep learning, the researchers followed the *total participation technique cognitive engagement model*. According to this model, deeper learning can be supported through the creation of classroom opportunities that encourage young learners to think through the implications and the relevance of classroom activities to their own world. Their findings showed that with the use of role-play activities which build on the specific affordances of virtual worlds, students display greater higher order thinking skills than in the non-ICT control groups suggesting that the 3D environment has an impact on cognitive development. However, as the authors themselves remark, these findings are based on student and teacher feedback only and do not include all of the data collected over the entire research period and are limited to text-based interaction.

Finally, the notion of sense of presence as triggered by the immersiveness of the environment and the role-play potential it carries is also advocated by Lim (2009, p. 8) in his discussion of "learning by being" in virtual worlds. According to Lim (2009, p. 8), *learning by being* refers to the learning that one experiences as a result of explorations of self and identity in the virtual world environment as made possible by the immersive nature of the environment.

Negotiation for Action (NfA)

In their paper, Zheng et al. (2009) analyze the user chat logs and other artefacts of a virtual world, *Quest Atlantis* (QA), and propose the concept of *negotiation for action* (NfA) to explain how interaction, specifically, avatar-embodied collaboration between native and non-native speakers, provided resources for English language acquisition. This concept is developed from the notion of *negotiation for meaning* at the heart of the interaction process between second language learners. Iterative multilayered analyses revealed several affordances of QA for language acquisition at both utterance and discourse levels. Through intercultural collaboration on solving content-based problems, participants successfully reached quest goals during which emergent identity formation and meaning making took place. The study also demonstrates that it is in this intercultural interaction that pragmatics, syntax, semantics, and discourse practices arose and were enacted.

Participation, Interaction and Learner Strategies

In an exploratory study, Peterson (2010) builds on his previous work and provides a discussion of learner participation patterns and strategy use in the language learning of seven intermediate EFL (English as a foreign language) students in Japan in a virtual world platform. Discourse analysis of student chat logs revealed that the specific context appeared to elicit a high degree of participation and autonomy. Participation and autonomy were measured in terms of student turns, peer-to-peer exchanges, learner-centred interactions, limited use of the L1 (students native language) and a high degree of focus on task of the interactions. The transcripts showed the use of 5 main transactional strategies (split turns, time saving devices, addressivity, upper-case and quotation marks) and of 2 key interactional strategies (politeness and keyboard symbols). It was observed that adaptive strategies are also used by students such as transfers from both non-computer forms of interaction and other types of CMC such as email. Learners' attitudes were also taken into consideration but no causal relationship was established between positive attitudes and participation strategies. Task design and telepresence, which is understood as learners' sense of presence in the virtual world as experienced through their avatars, are listed as features which may have had an impact on the study outcomes and which require further investigation.

Non-verbal Participation

In their study, Wigham and Chanier (2013) provide a classification of verbal and non-verbal communication acts within a CLIL (content and language integrated learning) course for architecture students in *Second Life*. The study attempts to understand multimodal communication structures through learner participation and learning practices in a collaborative learning setting. The classification developed by the authors builds on studies in the second language acquisition (SLA) research literature on non-verbal and verbal communication in face-to-face contexts and a discussion of non-verbal communication in *Second Life* where a distinction is made between user-generated and computer- generated acts. The authors then proceed to subdivide these categories further based on the communication act rather than with reference to how they are encoded by the user and the synthetic world. The modalities listed by the authors (2013, pp. 66-68) are those of avatar proxemics (orientation), kinesics (gaze, posture and gestures) and appearance. The category of gestures is subdivided further to include extra-communicative acts (not defined by the authors in this paper), iconics (gestures which are a representation of an action or an object), deitics (the act of an avatar touching or manipulating an object), emblems (cultural gestures) and pantomimes (avatar animations of crying, smoking and typing, for example). Emblems are further divided into performative emblems, word emblems and meta-discursive emblems but these concepts are not expanded upon by the authors.

A comparison between learner verbal and non-verbal communication during the course led the authors to conclude that nonverbal acts contribute to communication and learning in virtual worlds and that the preference for one mode over the other was determined by the role of the learner within a given learning task. The study indicates, furthermore, that learners were able to adapt to the communicative features of the environment and to use the nonverbal communicative features to overcome ambiguity in verbal communication. In particular, the authors highlight (2013, p. 82) the importance of proxemic closeness for L2 activities which involve collaboration and building. To conclude, Wigham (2012) discusses this supportive and dynamic relationship between verbal and non-verbal activity within the context of language learning in virtual worlds in general as *interplay*.

Engagement Among Peers

In Deutschmann and Panichi (2009b), learner interaction is discussed with reference to language awareness and learner engagement in online communication. In particular, the authors compared the first and the last sessions from an online oral proficiency course aimed at doctoral students conducted in the virtual world, *Second Life*. The study attempts to identify how supportive linguistic moves made by the teacher encourage learners to engage with language, and what type of linguistic behaviour in the learners leads to engagement in others. Overall differences in terms of floor space and turn-taking patterns were compared, and an in-depth discourse analysis of parts of the sessions was conducted with a focus on supportive linguistic moves such as back-channelling and elicitors. Their research indicates that the supportive linguistic behaviour of teachers is important in increasing learner engagement. In the study the authors were also able to observe a change in student linguistic behaviour between the first and the last sessions with students becoming more active in signalling involvement as the course progressed.

Language Learner Turn Taking and Floor Space

In Deutschmann, Panichi and Molka-Danielsen (2009), two stages of an action research project involving two oral proficiency courses held in the virtual world, *Second Life*, were compared. Based on the experiences of this course, the researchers redesigned many aspects of it in order to improve student activity in terms of oral participation. The study was able to measure student participation based on floor space, turn lengths and turn-taking patterns and examine whether changes in design had contributed to more favourable outcomes in terms of learner participation. Results seem to indicate that meaning-focused task-design, which involves authenticity and collaborative elements, had a direct impact on learner participation and engagement. Furthermore, the results suggest that technical and social initiations into a complex environment such as SL are important factors to be borne in mind when designing tasks for a course in a virtual world. Recent research in the field by Wang (2017) uses a similar approach and confirms the validity of both the initial study by Deutschmann and Panichi (2009b) in the previous subsection and Deutschmann et al. (2009) mentioned in this section.

A Sense of Belonging

Molka-Danielsen, Panichi and Deutschmann (2010) reviewed reward models used in learning and teaching in virtual worlds and illustrated how reward models in language education are often irrelevant and have minimum impact in traditional face-to-face settings. The authors also refer to reward models borrowed from flow theory and self-determination theory and suggest ways of applying these to language learning activities in virtual worlds to increase motivation to participate. They make the distinction between tangible and intangible rewards. Tangible rewards include, for example, objects such as T-shirts while intangible rewards would be the awarding of a specific status within the world which would carry specific privilege. They identify key elements that need to be included in a reward model for active language learning in *Second Life* such as immersion through the use of a narrative genre, encouraging a “flow-state” with the right balance between challenges and achievements and, last but not least, space for personal constructs that foster a sense of belonging and community. The main argument of this article is that the greater the “tangibility” of the rewards afforded to the learner through the specific features of the virtual world environment, the higher is the learners’ sense of belonging to and participation in the language learning community both within the virtual world and within the broader learning context.

Community

Closely related to learners’ sense of belonging is the concept of community and community building. Molka-Danielsen and Panichi (2010) look at teacher and trainer strategies that are supportive of community building and relevant to learner participation in learning. Examples are taken from the Avalon Learning Project. Active learning theories such as activity theory are used to explain the importance of building community for adoption and success of a learning system. In particular, this article focuses on the role of the expert teacher in encouraging the development of a sense of a community among learners and the skills required for such task. The importance of community is also confirmed by Nocchi’s (2017) activity theory-based analysis of learners of Italian within the Italian native speaker community of the virtual world, *Second Life*.

Factors Affecting Interaction in Virtual Worlds

Wang et al., (2013) examined factors that affect interaction within an online virtual world course in sociolinguistics and collected information regarding learner linguistic participation through the learner contributions to voice-chat and text-based chat within the virtual world platform. The authors suggest that future research not only needs to take into consideration these factors in relation to participation but also needs to look at how factors influence other factors in a more dynamic and complex relationship to participation. In addition, the authors proposed that virtual worlds have a stronger amplifier effect on participation compared to other CMC tools and that, as a result, greater attention needs to be paid in the literature on the medium as a factor effecting participation. More specifically, they argue that the role of virtual world platforms such as *Second Life* can be neutral, positive or negative based on the degree of intensification of impact of the medium on the factors which have been deemed to influence participation. In particular, they point to teacher intervention as a way of addressing the role played by virtual world platforms on learner interaction and participation.

In addition to the above, Molka-Danielsen, et al., (2010) argue for the need to take into consideration quality of experience in understanding factors that impact on technology supported learning, including virtual worlds. With reference to learner motivation and participation in virtual worlds they list the following variables as being relevant: clear course design, the nature of the environment; the scope of student self-determination; strong peer collaboration and appropriate technical initiation (2010, p. 46). They also explain that the degree to which a virtual environment is authentic and reflects the personal interest of its users is an important factor in quality of experience for end-users and its applicability to serve pedagogical innovation (2010, p. 49).

Designing for Participation in Virtual Worlds

This section will examine the CMCL literature on task design with a special focus on designing for participation in the context of language learning in virtual worlds from different theoretical stances and/or methodological approaches.

Participation as Simulation

Jauregi et al. (2011) examine the development and use of interaction tasks for intercultural communication within the context of the EU funded Niflar project with the specific aim of exploiting the affordances of the environment. The activities that took place under the project made use of both text-based and voice-chat. The authors conclude that general task design principles as stated in the SLA literature need to be adapted for 3D virtual worlds so that rich oral interaction is triggered for task completion while making the most of the exploratory, functional and gaming possibilities of the virtual world platform of *Second Life*. In particular, the authors point to the need to exploit the specific realism or “life-likeness” of the environment to support more immersive simulations.

Participatory Skills in Online Gaming for Language Learning

Building on his previous research into language learner strategies in virtual worlds, Peterson (2012b) reports on an exploratory case study of student linguistic and social interaction in text-based chat in the massively multiplayer online role-playing game (MMORPG) of *Wonderland*. This study is different to the previous study by Jauregi et al. (2011) as it does not discuss task design explicitly. However, as the author points out (Peterson, 2012b), the design of the game itself structures the type of activities that are available to students. It should be noted that the aim of all activities within the game are to enhance player participation in the game itself (playing) and that language learning in this specific study is incidental to the game. This case study differs also from previous studies carried out by Peterson as it looks at student interaction with players within the game who are not part of their formal learning context thus making the development of rapport with these players an essential part of the experience. Specific linguistic and social strategies that proved important in the learners' efforts to build rapport with other players were the use of positive politeness in the form of greetings, leave-takings, informal language, small talk and humour. Significant moves by students in building rapport and for their participation in the game were also the establishment and maintenance of intersubjectivity through the creation of friendships, teams and ongoing use of continuers or utterances designed to signal attention and interest in what interlocutors are saying. In addition, requests for assistance and requests for information were also used by students throughout the experience and considered important in terms of rapport building and maintenance of relationships with other players. The second part of this study looks explicitly at learner attitudes towards participation in virtual world platforms for massively multiplayer online role-play gaming (MMORPG). Results from the post-study oral interviews indicate that, in line with previous findings discussed elsewhere (Peterson, 2011), the game provided a steep learning curve for students in terms of their becoming familiar with the objectives of the game and with the required actions. Students also commented on the limitations of the in-game help features. Students however commented more favourably on other aspects of participation in the game. In particular, students claimed that the nature of the computer-based interaction combined with the use of pseudonyms and avatars helped reduce anxiety and contributed towards risk-taking in the use of the target language. Students also appreciated the opportunity to come into contact with native or expert speakers of the target language.

Transient Spaces for Different Modes of Participation

In the previous two studies (Jauregi et al., 2011 and Peterson, 2012b), task design is discussed from the point of view of design principles, in the general language learning literature in the first case, and from the point of view of gaming in the second. In a different project, "Virtual Campus for Life Long Learning", Molka-Danielsen, Deutschmann and Panichi (2009) discuss the virtual representations, tools, context and spaces used in course activities. This project provided for the design and building of spaces for language learning within a virtual world platform. They observed that, while the virtual world of *Second Life* can replicate the dynamics of the classroom lecture, it gives further opportunities for interactive and active teaching as learning activities can take place in dispersed and diversified virtual spaces. These can be defined as transient spaces insofar as participants, activities and representations change over time (Molka-Danielsen et al. 2009, p. 22). Designing transient learning spaces raises different challenges and opportunities from designing learning in the traditional physical classroom. Challenges include, *inter alia*, enabling new users to orient themselves in these spaces and how to behave in the new environments, for example. Transient learning spaces also offer new opportunities, such as the ability to design and develop a specific space for each course. In addition to this, the nature of the 3D environment is such that it allows for change and adaptation to occur and for the stakeholders in the process (teachers, learners and institutions) to negotiate the modes of participation that are relevant to them (i.e., formal, informal settings and processes, the tailoring of the environment, etc.).

Managing Participation through Instructional Design

Deutschmann and Panichi (2009a) discuss the various phases involved in designing a course for language learning in virtual worlds from scratch in an attempt to maximise learner participation specifically during the course. The key areas of this process they have identified include:

1. Familiarisation with the environment
2. Preparation of appropriate content
3. Meaningful task design (i.e., tasks that make use of the specific affordances of the environment)
4. Giving explicit instructions
5. Technical support
6. Socialisation opportunities
7. Taking learners' prior attitudes and expectations into account
8. Teacher roles and behaviour
9. Feedback opportunities
10. Fostering learner autonomy

As far as managing participation, the authors make several recommendations based on research findings published elsewhere (Deutschmann et al., 2009; Deutschmann & Panichi, 2009b). These findings suggest that learners can "learn" to participate in the virtual world if provided with specific input and support from teachers and that this skill can be developed over time as learners become not only more proficient in the target language but in the negotiation of communication skills in the specific environment as well. One final aspect that needs monitoring and to be made explicit with learners in the interest of participation and interaction is the use of the various communication channels for multimodal communication within the specific setting.

As far as task design is concerned in relation to the specific affordances of virtual world platforms, such as *Second Life*, the authors discuss (Deutschmann & Panichi, 2009a, p. 36) three dimensions in particular. The first dimension they refer to is the social/communicative/cognitive dimension. Tasks that make use of this dimension encourage learners to share and build on their knowledge through social interaction. The second dimension the authors refer to is the affective/creative dimension. Tasks that make use of this dimension promote the exploration of identity, cultural norms, values and encourage artistic expression and representation such as performance. The third dimension of virtual worlds that can be exploited through specific task design is the spatial/physical dimension. Tasks in this dimension encourage learners to use the virtual world platform as a source of information and for the exploration of existing artefacts, as a space for navigation and movement and as a place for cross-linguistic and intercultural contact through interaction with other users.

A final consideration is made by Panichi et al., (2010) in relation to designing for the affective dimension of learners in virtual worlds. In particular they discuss how the visual nature of the environment may impact on learners. For example, they suggest learners may react differently to the environment based on their own individual beliefs about teaching and learning. Some students may find the game-like feel of the platform does not coincide with their understandings of what education "should" be. They suggest that the creation of environments which somehow replicate learners' previous experiences of learning (i.e., a space with desks or a whiteboard) may facilitate transition to and acceptance of learning in the virtual world platform. Similarly, it may be that the replication of non-virtual reality rituals such as sitting in a circle, standing up to talk to the class, facing an avatar who is talking to you and walking out of the door when you leave the room may contribute to individual perceptions of participation and control (Panichi et al., 2010, p. 183). Last but not least, the authors also suggest teachers and designers bear in mind teacher avatar appearance and the impact that it might have on learners from different backgrounds.

Combining Different Participation Needs

Deutschmann et al. (2011) use activity theory to examine how task design incorporated a variety of aspects which ultimately led to greater learner motivation and participation. Using an activity theoretical model, the case study describes the design and initial implementation of a telecollaborative learning activity between four universities in *Second Life*. The four student groups were all attending quite different programs within their own institutions. The main challenges encountered were that of accommodating the different needs taking the diverse motivational objectives of each group into account, and making use of the affordances of the tool (the virtual world of *Second Life*) in this pursuit. Examples of different learner needs in this context were:

- language proficiency levels
- institutional requirements
- timetabling and attendance options
- syllabus requirements
- learning objectives

CONCLUSION

In this final section, I would like to summarize what CALL CMCL research into virtual worlds has achieved since its outset based on the discussion in the previous three sections. In doing so, I would also like to discuss what our research says about us as a research community and what the implications of this are in terms of future research. First, if we examine the progression of the research foci discussed in both sections it is clear that the primary interest of the research community remains *learner in-world interaction* in support of language learning. This primary research focus on learner interaction has been and continues to be discussed in relation to learner verbal and non-verbal activity, learner affect, community and task-design. Indeed, this should come as no surprise as these aspects of language learning are primary concerns of the language teacher and materials developer in face-to-face, classroom-based education as well. If we were to run a validity check or some sort of quality control on this, I would argue that we have indeed been researching those aspects of CALL that are meaningful to our profession and to language acquisition in general and beyond CALL. Furthermore, it needs to be highlighted that while there are a number of limitations with regard to practitioner research outcomes in terms of external validity and generalisability, there are also several advantages. In particular, the research carried out to date has certainly benefitted from the practitioner-researcher knowledge of and ongoing learning about the environment and their ability to constantly act as intermediaries in mediating between pedagogic knowledge and knowledge of the learning context. Undoubtedly, the depth of understanding that comes from informed pioneer practitioner experience and the intuitions that spring therefrom are both important elements in the creation of collective knowledge and are arguably of great value when documented within research frameworks albeit reflective practice ones.

If we take a look at the breadth and the complexity of the research, it is clear to see how we have progressed from exploratory teacher-researcher studies to the carrying out of more methodologically grounded research. If we consider in particular the work by Wigham (2012), Panichi (2015b), Nocchi (2017) and Wang (2017) it needs to be noted that this research is the result of four PhD projects carried out independently in four different European countries (France, the UK, Ireland, and Sweden respectively) and which arguably gave the researchers the necessary time and formal institutional framework and support to carry out the broader research projects our community had explicitly called for. The contribution to the field in particular of these broader research projects lies in their applying a combination of existing theories and approaches within the SLA and CALL tradition to uncharted territory and by adapting existing qualitative research methods in ways that enabled researchers to document for the first time, instances of interaction that had previously gone undetected.

Finally, having had the privilege to work closely with many fellow researchers over the last 10 years and having been directly involved in the management and intellectual development of two major research projects on virtual worlds for language education funded by the European Union such as *Avalon* and *Euroversity* from 2007 onwards, I would like to suggest that we, as a community, have achieved what was reasonable and necessary to achieve given the constant constraints of time, funding and human resources. In other words, we must not forget the context in which virtual world research has been carried out from the outset, at least within Europe. Indeed, most practitioner-research was carried out thanks to the determination and the computer and technical skills of the pioneer researchers and was often entirely dependent upon the individual teacher-researcher's ability to instigate opportunities for in-world language exchanges through personal networks and to develop and build courses in-world for their learners. In this sense, we cannot overlook the time and the technical know-how that were constantly required of all of us as a virtual world educational community to build, run, validate and maintain virtual world environments and to keep up concurrently with the speed of new developments and changes in protocols. To sum up, the reviews in the sections above have illustrated how we have gone from small manageable research studies by individual practitioner-researcher-developers that well served our teaching and learning communities at the time as a way of validating our thinking about teaching, to providing a response to the call from our research community for broader methodological approaches in our research. The question, thus, is now: *Where do we go from here*?

Now, while recognizing Peterson's call (2016) mentioned in the introduction to this paper for quantitative research as a justified means of attempting to approach what we have done so far from a different angle, I am not, however, convinced that quantitative research in opposition to qualitative approaches is what we really need in light primarily of the medium which is at the heart of our investigations. The authors argue, for example, in Wigham et al.'s editorial (2018) on interaction in virtual world language learning with reference to virtual worlds that:

> *These spaces are now recognised as complex environments that need to be better understood if researchers want to tap into their educational potential, and this requires a drastic change of approach. The trend is quite clear: researchers in VWs are now showing an interest in looking at these environments through a different lens, which is able to incorporate the complexity of learning in VWs. (Boellstorff, 2015; Gregory, Lee, Dalgarno & Tynan, 2016), (Wigham et al., 2018, p. 154)*

This call for research approaches that are better equipped to capture complexity is echoed in recent CALL research and with particular reference to virtual worlds in Schultze (2017). Here the author argues that complexity theoretical approaches may provide new ways of hypothesizing about and conceptualizing the complex phenomena of language use and (second) language development, and will require different data gathering and analytical methods. Schultze argues that learner interaction in CALL and virtual worlds need to be understood as complex adaptive systems (CAS) which, due to their complexity and fluidity, are not completely deterministic in the sense that causal relationships between events and their outcomes cannot always be established, in particular in view of the innumerable variables that come into play. The question, thus, for virtual world researchers, would appear to be how to proceed in capturing complexity. Could this be a much-needed opportunity for us as a research community to make the effort of going beyond the traditional and often overbearing binary distinction between qualitative and quantitative? Can we conceive of a research paradigm that is able to, on the one hand, take into account the depth of our practitioner-research knowledge and both the richness and constraints of our contexts; and, on the other, do full justice to the foci of our research, to the complexity of learner interactions in virtual worlds and, simultaneously to our need to move forward? In a call for innovation in research approaches to interaction in virtual worlds, Savin-Baden, Gourlay and Tombs (2010) argue that while established research methodologies have been successfully applied to the context of virtual worlds, the specific features of these immersive realities require new approaches that are congruent with the environment. For example, they state how capturing the concept of "immersion" which involves notions of embodiment and various types of 'presence' is an ongoing challenge for virtual world researchers within the constraints of traditional paradigms.

A final consideration that needs to be made, I would argue, is that we need ultimately to think about what we want to achieve both in the short term and the long term. In particular, when dealing with technology which is forever evolving, perhaps small scale, tentative, exploratory practitioner-led research is what we actually need. While recognizing that much has been done in terms of small scale qualitative teacher-led research already and that we do now have at our disposal more robust methodological approaches, I would like to argue that our research decisions, however, constantly need to be reviewed with reference to the contexts in which we operate and the communities we serve. In this sense, without excluding other approaches, I think we can nevertheless continue to benefit from research studies that are small and exploratory and whose results are adaptive and suggestive of what might be.

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KEY TERMS AND DEFINITIONS

Immersive: When talking about virtual worlds in language learning, we say that the experience is "immersive" when you feel like you are part of the environment.

Interaction: In virtual world CALL research, interaction is understood as learner verbal and non-verbal activity in the platform.

In-world: This expression is used largely by users of virtual worlds to refer to the act of being in the virtual world platform through the use of an avatar. If you are in the platform you are "in-world", i.e., in the virtual world.

Participation: In virtual world CALL research, participation is a broader notion than interaction and can be understood as learner target language use and intentional and contextualised nonverbal activity in support of learning.

Practitioner Research: Research that is carried out by teachers when investigating their own practice and the context of their teaching.

Qualitative Research: Research that focuses on understanding phenomena via in-depth detailed descriptive and observational analysis. In qualitative research, the researcher recognizes herself as being an integral part of the research context.

Quantitative Research: Research that attempts to measure phenomena and that will generally include large data sets so that any statistical information that is produced can be considered predictive of phenomena in identical contexts.

Virtual Worlds: Nowadays, these are mostly three-dimensional computer simulation platforms which users can access via an avatar. These platforms may be used to interact with other people such as *Second Life*™ or for online gaming with other players such as *World of Warcraft.*

Chapter 4

A Review of Research on the Application of Digital Games in Foreign Language Education

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ABSTRACT

The use of digital games represents an expanding domain in computer-assisted language learning (CALL) research. This chapter reviews the findings of 26 learner-based studies in this area that are informed by cognitive and social accounts of SLA. The analysis shows that massively multiplayer online role-playing games (MMORPGs) are the most frequently investigated game type and the majority of studies involved EFL learners in higher education. Mixed methods were the most frequent research tool utilized by researchers. Limitations of current research include the preponderance of small-scale experimental studies that investigated only a limited number of factors. Although the research is not conclusive, findings indicate that game play facilitates collaboration, the production of target language output, vocabulary learning, and reduces the influence of factors that inhibit learning. This chapter concludes by identifying promising areas for future research.

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INTRODUCTION

The use of digital games in foreign language education represents an increasingly influential area of research in computer assisted language learning (CALL). This chapter reviews the findings of 26 learner-based studies that are informed by second language acquisition (SLA) research. Examining this body of work through the conceptual framework provided by influential cognitive and social accounts of SLA, the discussion explores the contexts, methods and findings reported in peer-reviewed studies conducted in this area. This chapter concludes by identifying limitations of the current research base and identifies areas of potential in future research.

BACKGROUND

The dramatic growth of the internet and the proliferation of low-cost computing technologies have led to a significant expansion in research on many aspects of computer-assisted learning. Of the many aspects of this phenomenon currently under investigation, digital games are attracting increasing interest from education researchers (Ott, Stanescu, Popescu, & de Freitas, 2013). Although research in this area dates back over four decades, the pervasive nature of online gaming and the emergence of new and more accessible digital games are widely seen as significant phenomena that have stimulated a renewed focus on their use in education (Gee, 2007a; Whitton, 2010). A variety of commercial off-the-shelf (COTS) and serious games, that is, games designed for educational purposes, have been explored in a wide range of fields (Dondlinger, 2007). Recent large-scale meta-analysis of findings from studies on the use of contemporary digital games in education provide evidence suggesting that these games can support learning in certain learner groups (Clark, Tanner-Smith, & Killingsworth, 2016) and that their use appears, in the majority of studies, to facilitate knowledge acquisition across a number of domains (Connolly, Boyle, MacArthur, Hainey, & Boyle, 2012; Wouters, van Nimwegen, van Oostendorp, & van der Spek, 2013). However, although computer gaming is now ubiquitous, research on its use in language education remains limited (Peterson, 2013). Discussion of anecdotal and conceptual work abounds in the literature (Anderson, Reynolds, Yeh, & Huang, 2008; Li & Topolewski, 2002; Sykes, 2013). However, as has been noted (Cornillie, Thorne, & Desmet, 2012), there are fewer studies that report on learners' game-based activities. Researchers emphasize that many aspects of the use of digital games as learning environments remain unexplored (Godwin-Jones, 2014). Nonetheless, in recent years, there has been renewed interest in this area and substantive studies involving a variety of COTS and serious games have been undertaken (Lai, Ni, & Zhao, 2012; Peterson, 2017). The following discussion identifies the key distinguishing features of digital games highlighted in the literature.

Features of Digital Games

The literature contains numerous attempts to define the nature of digital games (Newman, 2004). However, researchers have yet to come to a consensus regarding a definition (Zagal, 2010). Although the debate on this issue continues, there is general agreement that most digital games incorporate a number of features that combine to provide unique opportunities for learning and that distinguish them from other digital environments investigated in education research (Wolf & Perron, 2003). One feature frequently identified by researchers is their rule-based nature (Juul, 2005). Unlike other digital environments such as, for example, virtual worlds, which are created as open environments, contemporary digital games are goal-directed and specifically structured to reflect the preferences of their designers. The purposeful nature of play in games is enhanced by the goals set by the games designers and is also facilitated by the element of competition that is a central feature of digital games. Unlike other online environments used in education, digital games are explicitly designed to require players to compete either against other players or with oneself (Gredler, 2004). The competitive nature of game play is reflected in the reward systems that form a central element of digital games (Gee, 2007b). For example, on completing a specific task, an individual player may obtain a reward such as a new game skill or points that enable progression to a higher level of status in the game.

Another distinguishing factor noted in the literature is the high degree of immersion provided (Gerhard, Moore, & Hobbs, 2004). Digital games immerse players in visually appealing simulations that are of higher quality than those found in most other types of digital environment used in education. Moreover, the nature of the activities required by contemporary digital games are identified as significant (Gee, 2007b). Well-designed games compel players to undertake progressively more challenging interactive tasks that frequently require either individual or collective problem solving. The requirement to collaborate inherent to many of the major games designed specifically to facilitate social interaction is another feature identified as noteworthy (Prensky, 2001). An additional feature emphasized in research is the frequent use of narrative (Atkins, 2003). Researchers observe that many contemporary digital games contain all the elements of narrative (Murray, 1997; Ryan, 2006). The discussion in the following sections first examines how the above features are hypothesized as supporting learning and then proceeds to explore the conceptual framework that provides the basis for this review.

Digital Games and Learning

Education researchers claim that the features of digital games identified previously may facilitate learning (Gee, 2007a; Prensky, 2001). As Table 1 shows, the rule-based nature of game play is identified as supporting purposeful interaction. This feature, coupled with the use of competition and reward systems, is widely viewed as an important contributory factor to the emotional attachment and high levels of motivation that are reported in the literature (Connolly, Stansfield, & Hainey, 2011; Papastergiou, 2009). The high degree of immersion and the nature of activities utilized in digital games, that elicit participation in problem solving, are perceived as beneficial. It is claimed that immersion in high-quality simulations supports participation and that well-designed game tasks elicit meaningful contextualized feedback from peers, providing potentially valuable opportunities for learning (Gee, 2007b). Such activities enable learners to apply new knowledge and skills, thus allowing them to actively participate in the learning cycle. In this context, the positive and negative feedback that is provided on individual performance fosters a sense of agency. Moreover, games that require social interaction and sustain in-game and out-of-game online communities are viewed as providing access to communities of practice that are conducive to socialization and literacy development (Steinkuehler, 2006). Finally, the use of narrative in many games is identified as important. It is claimed that this feature contributes to the creation of conditions in which learning may occur by providing players with a familiar and comprehensible structure (Dickey, 2006).

Table 1. Features of digital games hypothesized as facilitating learning

Features	Hypothesized Advantages
• Rule-based nature.	• Supports purposeful interaction.
• Competition and rewards.	• Enhances motivation and emotional investment.
• Immersion.	• Facilitates participation.
• Problem solving.	• Feedback fosters a sense of agency.
• Social nature.	• Access to communities of practice that support socialization and literacy development.
• Narrative.	• Provides a familiar and comprehensible structure.

The Cognitive Justification for the Use of Digital Games in Language Education

The cognitive account of SLA asserts that language learning is an innate human capacity (Long, 2012). From this perspective, SLA is largely an inner-mental phenomenon that occurs in the mind of the individual learner (Lafford, 2007). The cognition involved in language acquisition is perceived as operating independently from social context (Gass, 2000). The cognitive account posits that individuals may acquire language through exposure to target language (henceforth TL) input and engagement in the production of modified TL output (Varonis & Gass, 1994). Furthermore, experiences involving interaction in the TL and particularly interaction involving feedback, are hypothesized as facilitating language acquisition (Long, 2006). This type of interaction is perceived as important as it enhances learner awareness and also elicits negotiation of meaning. This phenomenon is triggered when problems arise during communication and fosters the production of modified TL output, a process held to play a central role in language development (Varonis & Gass, 1985). The cognitive account of SLA further emphasizes the influence of affective factors, such as attitudes, on learners' linguistic development (Krashen, 1985). The cognitive justification for the use of digital games asserts that many digital games provide access to the conditions for learning hypothesized in the cognitive account of SLA.

As Table 2 shows, the possibilities for language learning identified in the cognitive justification for the use of digital games relate to individual experience, TL exposure, and interaction. In the case of the former factor, as digital games incorporate goal-orientated tasks that are authentic in nature, they provide opportunities to use the TL in a purposeful manner. It is asserted in the literature that this aspect of gaming enables learners to encounter experiential learning at first hand (García-Carbonell, Rising, Montero, & Watts, 2001). The feedback on individual performance provided by games facilitates reflection and noticing, factors that are posited as supporting acquisition in the cognitive account of SLA (Schmidt, 1990). In addition, the experience of the learning cycle provided by digital games supports the feelings of achievement necessary for sustained success in language learning (García-Carbonell et al., 2001). Regarding TL exposure and interaction, CALL researchers draw attention to both the quantity and quality of the TL elicited by participation in gaming (Reinders & Wattana, 2015b). As games require TL use, they may promote production of the comprehensible output that is hypothesized as playing a central role in the process of SLA (Swain, 1995). As TL-rich environments, digital games may also provide exposure to new L2 vocabulary providing opportunities for acquisition. Games that support TL interaction with other players may further enable learners to engage in the meaning negotiation (Pica, 1994) that is widely perceived as facilitating learning in the cognitive account (Long, 1996). Furthermore, the environment for interaction provided by many digital games is informal and frequently low stress (Horowitz, 2019). This provides opportunities for learning, as the influence of affective variables that are viewed as inhibiting learning in the cognitive account of SLA such as anxiety, is significantly reduced. Moreover, the learner-centered nature of gaming may enhance motivation, facilitating language development (Liu & Chu, 2010).

Table 2. Hypothesized advantages of participation in digital gaming from the perspective of cognitive SLA research

Features	Hypothesized Advantages
• Authentic goal-orientated tasks.	• Opportunities for individual learners to directly experience the learning cycle.
• Feedback.	• Facilitates reflection, noticing and fosters a sense of achievement.
• Require TL use.	• Elicits TL production and provides exposure to comprehensible input providing opportunities to engage in meaning negotiation.
• Learner-centered context.	• Affective barriers to learning reduced. • Motivation enhanced.

The Social Justification for the Use of Digital Games in Language Education

A more recent rationale for the use of digital games in language education reflects advances in technology and SLA research. Researchers observe that the emergence of a new generation of highly sophisticated digital games has coincided with the increasing influence of accounts of SLA that privilege the role of social factors (Zhao & Lai, 2009). The sociocultural account of SLA views language learning as not only an inner mental process but also a social phenomenon (Zuengler & Miller, 2006). In this account, it is claimed that language is acquired through use (Firth & Wagner, 1997). The process of language learning is perceived as being shaped by factors external to the individual learner and is determined primarily by social context (Tarone, 2007). Language is viewed as a resource and a mediating tool that enables learners to engage in cognitive development through social interaction with others (Lantolf & Thorne, 2006). The sociocultural account of SLA focuses on the nature of the collaboration between learners and their peers. It is hypothesized that participation in activities that elicit TL dialogue involving assistance enhances learners' L2 development by facilitating internalization. In this context, researchers (Lantolf & Thorne, 2006) emphasize the concept of the zone of proximal development (ZDP), that is, the difference between a learner's potential and actual level of development (Vygotsky, 1978). It is claimed that conditions for learning are created when learners collaborate in solving problems with more capable peers. This later process enables learners to close the gap between their actual and potential level of performance, leading them to achieve self-regulation, independence, and higher levels of TL competency (Lantolf, 2000). Moreover, as this account is concerned with the influence of the TL culture on learner development, it also emphasizes the importance of language socialization on SLA (Watson-Gegeo, 2004).

A contemporary justification for the use of digital games may be found in the work of researchers who view social interaction as the wellspring of language development (Sykes, Reinhardt, & Thorne, 2010). It is claimed that digital games designed to require TL use and social activity, such as massively multiplayer online role-playing games (henceforth MMORPGs), offer access to conditions identified as supporting learning in the social account of SLA (Thorne, Black, & Sykes, 2009). As Table 3 shows, social games compel learners to engage in activities that require problem solving and collaboration involving TL interaction with other players, eliciting forms of dialogue that play a central role in SLA, such as assistance, reciprocity and co-construction (Reinhardt & Thorne, 2016). It is asserted that the nature of activities in well-designed games provides access to social contexts where learners can develop their language skills and knowledge through sustained TL dialogue with peers (Sykes et al., 2010). Another advantage identified by researchers is that these games offer players membership of extensive in-game and out-of-game social groups that provide access to communities of practice, where learners can undergo socialization in the TL (Thorne et al., 2009). Furthermore, as social games are frequently large-scale, and incorporate players located in diverse geographical locations, they enable language learners to interact with a wider variety of interlocutors than is possible in traditional educational contexts.

The opportunities for intercultural communication provided by this type of interactional context are perceived as potentially valuable for language learners, as they offer the prospect of enhancing the development of cross-cultural skills and knowledge of the TL culture (Reinhardt & Thorne, 2016). Finally, researchers who propose the social rationale claim that the combination of features outlined above provides access to unique contexts for learning that are challenging to replicate in conventional language classrooms.

Table 3. Hypothesized advantages of participation in digital gaming from the perspective of social SLA research

Features	Hypothesized Advantages
• Compel collaboration in the TL.	• Learners engage in problem solving. • Elicit dialogue involving assistance, reciprocity and co-construction.
• Provide membership of in-game and out-of-game social groups.	• Access to communities of practice. • Exposure to language socialization.
• Access to diverse groups of interlocutors.	• Opportunities to enhance cross-cultural skills and knowledge of the TL culture.

METHOD

The Purpose of This Review

Research on the use of digital games in CALL is expanding (Sykes, 2018). However, to date, there have been few attempts to review work in this area. In this context, a review of findings from available research is now timely. As noted in the literature (Boulton, 2015), more research of this nature is needed in CALL. This endeavor offers the advantage of highlighting both the strengths and weaknesses of the current research base. In addition, it assists in the important tasks of identifying gaps in the literature and promising areas for future research. A review of findings drawn from current research enables preliminary conclusions to be reached regarding the validity of the claims made in both the cognitive and social rationales for the use of digital games. Moreover, an examination of findings from studies that draw on SLA research provides a principled basis on which to conduct future work (Chun, 2016). In this context, this study answers the following questions:

1. What theoretical perspectives have informed studies?
2. What types of games have been investigated in the literature?
3. What languages have been studied?
4. In what contexts have studies been conducted?
5. What areas have been the focus of investigation?
6. What methodologies have been utilized in research?
7. What aspects of language learning appear to be facilitated by game-based learning in studies that are informed by cognitive or social accounts of SLA?

The following sections outline the goal of the literature search, the procedures used, and the criteria for paper selection.

Procedures

The literature search was undertaken in order to identify relevant learner-based studies related to the use of digital games in CALL research. In order to achieve this objective, the researchers conducted a key word search using the terms *Computer Game, Video Game,* or *Digital Game*, combined with *Foreign Language Learning*, or *Second Language Acquisition*, or *Language Learning.* The search involved the following online databases: *ERIC, Scopus*, and *Web of Science*. The researchers also carried out an internet-based key word search using the above terms. In addition, the researchers conducted an online search of the following journals that specialize in publishing CALL research: *CALICO Journal*, *Computer Assisted Language Learning, International Journal of Computer-Assisted Language Learning and Teaching*, *JaltCALL Journal, Language Learning & Technology, ReCALL, System*.

The literature search was completed on June 1, 2018. In order to eliminate ineligible papers, the researchers working with two research assistants conducted screening of papers at the title and abstract levels. Full versions of potentially relevant articles were then retrieved and read by the researchers. In the event of a disagreement over suitability, the issue was resolved by a decision of the researchers. In order to be included in the analysis, papers identified in the literature search were required to meet the following criteria: the paper was published in English and reported on the results of a study that involved the gameplay or game-related activities of foreign language learners. Moreover, the research design investigated constructs articulated in either the cognitive or social rationales for the use of digital games in language education. Therefore, position papers, editorials and commentaries were not included. In order to establish the credibility of findings, papers were required to provide a detailed overview of the game investigated in the research, participants, data collection procedures, analysis methods, and significant outcomes. Furthermore, it was necessary for the paper to have been the subject of peer-review. On completion of the literature search, 26 papers were identified as suitable for inclusion in the analysis. Papers were selected from books, conference proceedings, and the following journals: *CALICO Journal*, *Computer Assisted Language Learning, Digital Education & Culture; Education Technology Research & Development, Foreign Language Annals, Interactive Technology and Smart Education, International Journal of Computer-Assisted Language Learning and Teaching*, *Journal of Computer Assisted Learning, Language Learning & Technology, Multimedia-Assisted Language Learning, ReCALL, Studies in*

Self-Access Learning Journal and *The Modern Language Journal*. An overview of the selected studies and their key findings is provided in Tables 4 and 5.

FINDINGS

Theoretical Perspectives, Game Types, Languages and Contexts

As Table 4 shows, the literature search revealed that a total of 12 studies were informed by cognitive SLA research (deHaan, 2005; deHaan, Reed, & Kuwada, 2010; Franciosi, Yagi, Tomoshige, & Ye, 2016; Miller & Hegelheimer, 2006; Ranalli, 2008; Rankin, Gold, & Gooch, 2006; Rankin, McNeal, Shute, & Gooch, 2008; Reinders & Wattana, 2011; 2014; 2015a; 2015b; Suh, Kim, & Kim, 2010). As may be observed in Table 5, analysis further shows that the majority of the research papers were influenced by social accounts of SLA (Bytheway, 2014; Hitosugi, Schmidt, & Hayashi, 2014; Lee & Gerber, 2013; Peterson, 2011; 2012a; 2012b; Piirainen-Marsh & Tainio, 2009; Rama, Black, Van Es, & Warschauer, 2012; Sundqvist, 2015; Thorne, 2008; Vosburg, 2017; Zheng, Young, Wagner, & Brewer 2009; Zheng, Newgarden, & Young, 2012; Zheng, Bischoff, & Gilliland, 2015). Analysis revealed that four game types were investigated: adventure, simulation, music and MMORPG. It was found that MMORPGs are the most frequently investigated type of game, with a total of 20 studies reported. Adventure (Hitosugi et al., 2014), simulation (deHaan, 2005; Franciosi et al., 2016; Miller & Hegelheimer, 2006; Ranalli, 2008) and music games (deHaan et al., 2010) accounted for a further six studies. COTS games predominated accounting for 22 studies. Serious games were implemented in a further four projects (Franciosi et al., 2016; Hitosugi et al., 2014; Suh et al., 2010; Zheng et al., 2009).

Table 4. Studies informed by cognitive SLA research

Author(s)	Participants	Game type/title	Area(s) investigated	Duration	Finding(s)
• deHaan (2005).	• One intermediate level learner of Japanese.	• Simulation *Jiikyoo Pawafuru Pro Yakkyu 6.*	• Listening comprehension. • Kanji character recognition.	• One month.	• Enhanced listening comprehension and recognition of Japanese kanji characters. • Ability to control the games' aural and textual language enhanced acquisition.
• Miller & Hegelheimer (2006).	• 18 Intermediate level ESL learners.	• Simulation *The Sims.*	• Vocabulary learning. • Use of supplementary materials.	• Five weeks.	• Online instruction prior to gameplay combined with supplementary materials enhanced vocabulary learning. • Learner feedback indicated that for the majority, access to the supplementary materials facilitated task completion.
• Rankin et al., (2006).	• Four beginner, intermediate, and advanced EFL learners.	• MMORPG *Ever Quest 2.*	• Vocabulary learning.	• Four hours of game play per week over four weeks.	• Intermediate and advanced level learners increased their TL output and understanding of vocabulary significantly during gameplay.
• Ranalli (2008).	• Nine intermediate level ESL learners.	• Simulation *The Sims.*	• Vocabulary learning. • Use of supplementary materials.	• Five weeks.	• Access to supplementary materials enhanced acquisition of vocabulary used in the game. • Positive learner attitudes towards supplementary materials.
• Rankin et al., (2008)	• 12 advanced EFL learners. • 12 advanced EFL learners and 7 native speakers.	• MMORPG *Ever Quest 2.*	• Vocabulary learning.	• Three hours of classroom-based gameplay.	• In two studies, no significant differences were found between groups in the first study. • In the second study, participants who worked in teams with native speakers performed better than those who played the game alone.
• deHaan et al., (2010).	• 80 EFL undergraduate EFL learners.	• Music *Parappa the Rapper 2.*	• Vocabulary noticing & recall.	•2 0 minutes of gameplay.	• Learners reported difficulty attending to gameplay and vocabulary. • Learners who played the game forgot significantly more vocabulary than those who watched the game.
• Suh et al., (2010).	• 202 elementary level EFL students.	• MMORPG *Nori School.*	• Learner achievement.	• Two 40-minute game sessions per week over two months.	• Participation produced no significant differences in terms of learning achievement. • Treatment group made greater gains in reading, writing and listening. • Prior knowledge, motivation and network speed had the greatest influence on learner performance.
• Reinders & Wattana (2011).	• 16 Thai beginner and intermediate level EFL undergraduates.	• MMORPG *Ragnarok Online* (modified version).	• Quantity and quality of learner TL output • Effect of game play on willingness to communicate.	• Three 40-minute sessions.	• Quantity of TL increased over the sessions. Quality of TL output variable. Majority of participants claimed willingness to communicate was enhanced.
• Reinders & Wattana (2014).	•30 Thai undergraduate EFL learners.	• MMORPG *Ragnarok Online* (modified version).	• Willingness to communicate.	• Six 90-minute lessons.	• Learners' willingness to communicate was enhanced.
• Reinders & Wattana (2015a).	• Five undergraduate Thai EFL learners.	• MMORPG *Ragnarok Online* (modified version).	• Willingness to communicate.	• Not specified.	• Learners reported that regular game play lowered affective barriers to learning and increased willingness to communicate.
• Reinders & Wattana (2015b).	• 30 Thai undergraduate EFL learners.	• MMORPG *Ragnarok Online* (modified version).	• Effects of game play on TL language use.	• Six 90-minute sessions.	• Statistical analysis confirmed that gameplay produced a significant increase in language use in both voice and text chats. • Learner game-based TL output contained a wider range of discourse functions and elicited more frequent contributions compared to in-class interactions.
• Franciosi et al., (2016).	• 213 EFL undergraduate students.	• Simulation *3^{rd} World Farmer.*	• Vocabulary Retention.	• Four 90- minute sessions.	• After regular game play, the treatment group outperformed the control on a post-test conducted 11 weeks after the treatment.

Table 5. Studies informed by social SLA research

Author(s)	Participants	Game type/title	Area(s) investigated	Duration	Finding(s)
● Thorne (2008).	● One native speaker of English One native speaker of Ukrainian.	● MMORPG *World of Warcraft.*	● TL interaction involving intercultural communication.	● Not specified.	● Gameplay elicited negotiation, requests, repairs, experimentation, and provision of explicit corrective feedback. ● Participants displayed reciprocity, humor, and motivation.
● Piirainen-Marsh & Tainio (2009).	● Two Finnish EFL learners.	● MMORPG *Final Fantasy.*	● Repetition.	● One year.	● The context elicited collaboration, socialization, and TL use.
● Zheng et al., (2009).	● Two EFL learners and two native speakers of English.	● MMORPG *Quest Atlantis.*	● TL discourse management. ● Intercultural communication.	● Ten weeks	● During interaction, participants engaged in collaborative dialogue involving co-construction in the TL. ● Leaners engaged in intercultural interaction and language socialization.
● Peterson (2011).	● Seven intermediate and advanced level EFL learners.	● MMORPG *Allods Online.*	● Interaction. ● Attitudes.	● Two 60- minute gamming sessions held one week apart.	● Learners effectively managed their interaction and engaged in TL dialogue. ● Positive learner feedback reported.
● Peterson (2012a).	● Six EFL learners.	● MMORPG *Nine Rift.*	● Learner in-game TL interaction ● Attitudes.	● Two 90- minute sessions held one week apart.	● Learners employed a variety of discourse management strategies that enabled them to effectively manage their interaction solely in the TL. ● Evidence of social interaction and collaborative dialogue involving requests and assistance. ● Learners claimed that the game was enjoyable, motivating and that they encountered new vocabulary. ● Delays (caused by lag), limited feedback, and support features hampered the interaction on occasion.
● Peterson (2012b).	● Four EFL learners from Japan, China, and Iran.	● MMORPG *Wonderland.*	● Learner in-game TL interaction. ● Attitudes.	● Four 70- minute sessions held over one month.	● Learners consistently engaged in TL dialogue involving assistance and co-construction. ● Learners found the game challenging but enjoyable and asserted that the context reduced anxiety providing opportunities for risk-taking and exposure to new vocabulary.
● Rama et al., (2012).	● Two Spanish as second language learners.	● MMORPG *World of Warcraft.*	● Patterns in TL language use.	● Five hours per week for seven weeks.	● Game play elicited collaboration and language socialization occurred. ● High degree of enjoyment and engagement observed. ● Game provided opportunities to develop communicative competence. ● The novice learner encountered difficulties due to lack of familiarity with game norms. ● Need to structure group interaction.
● Zheng et al., (2012).	● Three intermediate and advanced level EFL learners.	● MMORPG *World of Warcraft.*	● L2 communicative activities.	● A single 47-minute game session.	● During game play, learners undertook TL dialogue with other players involving a diverse range of communicative activities that would be challenging to reproduce in a conventional language classroom. ● Data showed evidence of extensive TL coaction, values realizing and intercultural communication.
● Lee & Gerber (2013).	● One beginner level EFL learner.	● MMORPG *World of Warcraft.*	● L2 language development.	● Regular gameplay over a one- year period.	● Learner language awareness was enhanced by game play. ● Learner experienced language socialization.
● Bytheway (2014).	● Six EFL learners.	● MMORPG *World of Warcraft.*	● In-game culture's effects on vocabulary learning strategies.	● Five hours of gameplay observation.	● The context and culture facilitated use of vocabulary learning strategies.
● Hitosugi et al., (2014).	● 20 advanced and intermediate level learners of Japanese as a foreign language.	● Adventure *Food Force.*	● Vocabulary learning. ● Learner attitudes.	● Five 50-minute class sessions per study held over 5 days.	● Integration of the game into regular class-based activity resulted in higher vocabulary retention. ● Positive learner attitudes.
● Sundqvist (2015).	● One EFL learner.	● MMORPG *World of Warcraft.*	● Extramural language learning.	● Out-of-school game play over a three-year period.	● Participant claimed out-of-school gameplay was enjoyable, facilitated risk-taking, and improved English skills. ● Test scores showed significant improvement in English proficiency over time.
● Zheng et al., (2015).	● One Japanese EFL learner and one native speaker of English.	● MMORPG *World of Warcraft.*	● Vocabulary learning.	● One two-hour game session.	● Data show instances of vocabulary learning unique to the context of the game.
● Vosburg (2017).	● 18 German foreign language learners.	● MMORPG *World of Warcraft.*	● TL production. ● Willingness to communicate.	● 90-minute game sessions held twice a week over eight weeks.	● Group dynamics influenced TL production and learner willingness to communicate.

In terms of the languages investigated, the majority of the research involved EFL learners with a further five studies focusing on learners of Japanese (deHaan, 2005; Hitosugi et al., 2014; Zheng et al., 2015), Spanish (Rama et al., 2012) and German (Vosburg, 2017).

As Table 6 shows, the majority of studies involved use of digital games in formal educational contexts. It was found that nine studies focused on game-based learning in informal out-of-school contexts (Bytheway, 2014; deHaan, 2005; Lee & Gerber, 2013; Piirainen-Marsh & Tainio, 2009; Sundqvist, 2015; Thorne, 2008; Vosburg, 2017; Zheng et al., 2009; Zheng et al., 2015). As may be observed in Table 6, the United States was the most frequent location for research studies. The remainder of the research was carried out in Europe, Asia and Australasia.

Table 6. Research contexts

Author(s)	Country	Context
• Hitosugi et al., 2014; Miller & Hegelheimer, 2006; Ranalli, 2008; Rankin et al., 2006; Rankin et al., 2008; Rama et al., 2012; Zheng et al., 2012.	• United States.	• Higher Education.
• deHaan, 2005; Thorne, 2008; Vosburg, 2017; Zheng, et al., 2009; Zheng et al., 2015.	• United States.	• Out-of-school.
• deHaan et al, 2010; Franciosi et al., 2016; Peterson, 2011; 2012a; 2012b.	• Japan.	• Higher education.
• Reinders & Wattana, 2011; 2014; 2015a, 2015b.	• Thailand.	• Higher education.
• Suh et al., 2010.	• Korea.	• Elementary school.
• Lee & Gerber, 2013.	• Korea.	• Out-of-school.
• Piirainen-Marsh & Tainio, 2009.	• Finland.	• Out-of-school.
• Sundqvist, 2015.	• Sweden.	• Out-of-school.
• Bytheway, 2014.	• New Zealand.	• Out-of-school.

Research Foci and Methodologies Utilized

It was found that the majority of studies had multiple research foci and two of the projects incorporated two studies (Hitosugi et al., 2014; Rankin et al., 2008). The major areas of investigation include affective factors (8), vocabulary learning (7), discourse management (3), quantity and quality of TL production (2), intercultural communication (2), L2 skills (2), and language awareness (1). As Table 7 shows, researchers adopted one of three approaches to data analysis. It was found that that mixed methods research predominated with a total of 16 studies utilizing this methodology. Qualitative research methods accounted for a total of five papers. The remaining studies utilized quantitative methods involving the use of descriptive statistics in data analysis. Within this latter group, it was found that four studies involved groups of 30 or more participants (Franciosi et al., 2016; Reinders & Wattana, 2014; 2015b; Suh et al., 2010). A further noteworthy aspect of the research was the limited number of longitudinal studies. Of the mixed method and qualitative studies, the majority (18) involved projects where data was collected over limited durations ranging from one 47-minute session to one semester. Analysis shows that only two papers reported on data that was gathered over a longer period. Lee and Gerber (2013) reported on data collected over one-year, and Sundqvist (2015) over three-years. In two further studies, the exact duration of the data collection was not specified (Reinders & Wattana, 2015a; Thorne, 2008).

Table 7. Methodologies used in research

Research approach	Number of papers	Author(s)
• Mixed methods.	• 16.	• Bytheway, 2014; deHaan, 2005; deHaan et al., 2010; Hitosugi et al., 2014; Lee & Gerber, 2013; Miller & Hegelheimer, 2006; Peterson, 2011; 2012a; 2012b; Ranalli, 2008; Rankin et al., 2006; Reinders & Wattana, 2011; 2015a; Sundqvist, 2015; Vosburg, 2017; Zheng et al., 2009.
• Qualitative.	• 5.	• Piirainen-Marsh & Tainio, 2009; Rama et al., 2012; Thorne, 2008; Zheng et al., 2012; Zheng et al., 2015.
• Quantitative.	• 5.	• Franciosi et al., 2016; Rankin et al., 2008; Reinders & Wattana, 2014; 2015b; Suh et al., 2010.

It was further found that researchers employed a total of 6 different data collection tools. The most frequent tools utilized by researchers were questionnaires (11 studies), followed by observation (10) and interviews (10). Other tools utilized in the data collection included surveys (5), learner journals (2) and field notes (1). Data analysis techniques utilized in the research included discourse analysis of game chat logs (11), descriptive statistics (10) and use of pre- and post-tests (8).

As Tables 4 and 5 show, there was a wide variation in the number of subjects reported in the research ranging in scope from a single learner (Lee & Gerber, 2013; Sundqvist, 2015) to 202 participants (Franciosi et al., 2016). Research has also involved learners of different age groups from elementary school age (Suh et al., 2010) to 30 years old (Bytheway, 2014). The majority of studies involved undergraduates aged between 18 to 22 years. Moreover, in a minority of the studies the age of the participants was not reported (Thorne, 2008; Zheng et al., 2015).

Aspects of SLA Facilitated by Game-Based Learning: Research Conducted from a Cognitive Perspective

TL Input and Output

Table 4 shows that studies have produced findings relevant to the central concerns of cognitive SLA research. Studies on the use of simulation games highlight the benefits of repeated exposure to the TL-rich environments provided by this game type. It is reported that this feature facilitates the development of L2 language skills including reading and listening (deHaan, 2005). Moreover, the abundance of everyday objects and contexts provided by this game type appears to assist learners in establishing lexical meaning (Ranalli, 2008). In terms of TL production, results reported from studies that involved the use of MMORPGs indicate that this type of game elicits the production of TL output (Rankin et al., 2006; Reinders & Wattana, 2011; 2015b). This finding lends support to the claim made in the literature regarding the value of participation in MMORPGs (Reinders & Wattana, 2015b). The findings reported in the above studies further indicate that regular gameplay in MMORPGs increases the production of TL output over time. However, findings are not definitive with regards to accuracy. Reinders and Wattana (2011; 2015b) note that although the TL output produced during gameplay in their research contained a wider range of discourse functions than in classroom interaction, the learners made errors and employed simplified registers.

Vocabulary Learning

The research examined here sheds new light on the assertion made in the cognitive rationale that sustained gameplay facilitates vocabulary learning. In the case of MMORPGs, findings are mixed. Results reported in the exploratory study undertaken by Rankin et al. (2006), indicate that for intermediate level EFL learners, repeated exposure to new vocabulary used in the game enhanced understanding. In contrast, the findings reported by Rankin et al. (2008) appear to contradict this claim as these researchers reported no significant difference between experimental and control groups in terms of vocabulary learning. Moreover, neither study reported any evidence that negotiation of meaning occurred. In the case of a music game, deHaan et al. (2010) found that learners who played a music video game found the activity demanding and recalled significantly less vocabulary than learners who watched the game play. These finding draws attention to the need for further research in this area. However, more promising results have been reported in studies involving the use of simulation and adventure games. Work involving simulation games reported by Miller and Hegelheimer (2006), and Ranalli (2008), provides convincing evidence that when this game type is implemented in conjunction with carefully designed supplementary materials vocabulary learning is facilitated. The large-scale experimental work involving an adventure game conducted by Franciosi et al. (2016) provides further evidence to confirm this finding by demonstrating that playing this type of game enhances retention of new vocabulary.

Affective Factors

Research draws attention to a further assertion made in the cognitive rationale for the use of games namely, that many digital games provide access to a low-stress context, where the influence of affective factors, that can inhibit learning, such as anxiety and lack of confidence, is significantly reduced (Reinders & Wattana, 2011). The results of the large-scale research on the use of a MMORPG reported by Suh et al. (2010), highlight the important influence of affective factors on learner achievement. The findings reported by Reinders and Wattana (2015a) show that learners claimed that affective barriers to participation were lower in the game than in conventional language classrooms. These researchers have further observed that this aspect of gameplay represents a major advantage of this type of game, as learner feedback in two of their studies indicates that desire to participate in TL discourse (willingness to communicate) increased significantly (Reinders & Wattana, 2011; 2014). These results, coupled to the positive learner feedback reported on the use of simulation games (deHaan, 2005; Ranalli, 2008), lend considerable support to the claim made in the cognitive rationale that the above game types may reduce barriers to learning enhancing motivation (García-Carbonell et al., 2001).

Findings examined in this discussion present evidence to support the claims made in the rationale for the use of games informed by cognitive SLA research. Studies show that MMORPGs and simulation games provide plentiful opportunities to experience authentic learner-focused experiential learning (Franciosi et al., 2016; Miller & Hegelheimer, 2006; Ranalli, 2008; Rankin et al., 2006), which enhances participation and motivation (Reinders & Wattana, 2011; 2015a). Furthermore, research on simulation games indicates that this game type may enhance vocabulary learning (Miller & Hegelheimer, 2006; Ranalli, 2008). However, research in this area is not conclusive. The negative findings reported by deHaan et al. (2010) draw attention to the need for caution in interpreting research findings relating to this issue. This finding highlights the fact that not all types of digital game may be suitable for language learners.

Aspects of SLA Facilitated by Game-Based learning: Research Conducted from a Social Perspective

Collaborative Dialogue

Table 5 shows that studies have produced findings corroborating key claims made in the rationale for the use of digital games informed by social SLA theory. Research indicates that network-based role-playing games provide access to highly engaging communication contexts that elicit social interaction in the TL (Peterson, 2012a; 2012b; Rama et al., 2012; Thorne, 2008; Zheng et al., 2009). Moreover, studies conducted in a variety of settings are consistent in demonstrating that these types of game enable learners to participate in TL dialogue. This involves types of interaction that are identified as supporting SLA in the social rationale including assistance, reciprocity and collaboration (Peterson, 2011; 2012a; 2012b; Piirainen-Marsh & Tainio, 2009; Thorne, 2008; Vosburg, 2017; Zheng et al., 2009; Zheng et al., 2012). In terms of vocabulary learning, researchers highlight findings indicating that the particular context for TL interaction provided by role-playing games facilitates acquisition in both institutional and out-of-school contexts (Bytheway, 2014; Peterson, 2012b; Sundqvist, 2015; Zheng et al., 2015). Researchers further report evidence that integration of an adventure game into the regular curriculum appears to enhance L2 vocabulary retention compared to conventional classroom-based activities (Hitosugi et al., 2014).

Positive findings are reported in regards to the claim made in the literature that digital games provide learners with access to the conditions for learning hypothesized in the social account of SLA. Although research to date has only involved small-scale exploratory work, and is therefore provisional in nature, studies in this area have revealed evidence suggesting that regular interaction in online games that are designed to facilitate real-time communication with peer and native speaker interlocutors enables learners to engage in the problem solving that facilitates language development (Peterson, 2012a; 2012b; Rama et al., 2012; Thorne, 2008). This intriguing finding suggests that interaction in this type of game may facilitate aspects of L2 learning such as vocabulary learning.

Language Socialization

The studies examined here also shed new light on other key constructs identified in the social rationale. Research indicates that playing MMORPGs raises learner awareness of the L2 and provides opportunities to experience language socialization in a highly engaging and authentic context for TL use (Lee & Gerber, 2013; Rama et al., 2012). Findings reported in studies further suggest that regular participation in MMORPG-based gaming offers access to game-based communities of practice. The requirement to collaborate and membership of game-based social groups are identified as significant in this regard, as these features enable learners to develop their L2 skills in a supportive, low-risk environment (Rama et al., 2012; Thorne, 2008; Zheng et al., 2012). Research findings also provide evidence to corroborate a further assertion made in the social rationale; the claim that participation in online gaming may facilitate intercultural communication as it enhances cross-cultural knowledge and skills. Researchers have reported findings indicating that regular participation in network-based gaming immerses learners in a context that is conducive to the development of cross-cultural knowledge and skills (Thorne, 2008; Zheng et al., 2009; Zheng et al., 2012).

Taken together, the findings discussed here provide evidence to support the central claims made in the social rationale for the use of digital games in CALL. Although research has only involved MMORPGs and an adventure game, it nonetheless indicates that these types of game provide access to novel and engaging contexts for social interaction and problem solving in the TL that are frequently challenging to replicate in conventional language classrooms (Thorne, 2008; Zheng, et al., 2012; Zheng et al., 2015). Moreover, studies indicate that MMORPG games provide learners with exposure to environments that may facilitate the process of language socialization (Lee & Gerber, 2013; Thorne, 2008; Zheng et al., 2009).

FUTURE RESEARCH DIRECTIONS

This research review shows that positive findings regarding the relationship between participation in gaming and language development have been consistently reported in the majority of studies involving MMORPGs, simulation and adventure games. Taken as a whole, the research findings examined here provide evidence to support the claims made in the cognitive and social rationales. Although the findings are not definitive, and research indicates that further work is necessary, of the games currently under investigation, MMORPGs appear particularly promising. However, at this juncture, a degree of caution is required. As the discussion demonstrates, findings are subject to significant limitations. As noted previously, current research is characterized by a preponderance of small-scale exploratory studies conducted in controlled settings that involved only limited numbers of participants and research designs. In addition, the majority of studies were of a relatively brief duration. Moreover, to date, researchers have focused on investigating only a small number of variables and aspects of gaming, leaving other areas with potential largely unexplored. For example, researchers have yet to systematically explore the potential of gaming to facilitate L2 grammatical development. Additionally, in the context of studies informed by social SLA theory, only two types of game (MMORPGs and adventure) have been investigated. Of the studies examined here, the majority involved the MMORPG *World of Warcraft*, other titles remain largely unexplored. Another noteworthy feature of the current body of research is that it is focused on undergraduate EFL learners based in North America and Japan. In reporting findings, few researchers have explicitly acknowledged the limitations of learner self-reporting or considered the possibility that their results may be the product of a particular context. Furthermore, there is little discussion of the potential influence of novelty and cultural issues. These factors limit the generalizability of findings.

Although not widespread, the presence of negative findings in some studies indicates that game-based learning may be challenging to implement in institutional contexts where computer infrastructures are limited (Peterson, 2012a; Rama et al., 2012; Rankin et al., 2006). Moreover, research suggests that certain game types may be unsuitable for language learners due to the cognitive demands imposed (deHaan et al., 2010). In future work, researchers would be well advised to familiarize themselves with the limitations of the current research base and the implications of the above findings. Acknowledging these factors will facilitate efforts to move research forward in a principled and coherent manner. This discussion highlights the need for more longitudinal studies that utilize mixed methods. In addition, current research involving case studies is infrequent with only two studies reported (Thorne, 2008; Zheng et al., 2015). The conduct of more case studies may shed new light on the potential of digital games to facilitate the learning of individuals and small groups. Furthermore, additional replication studies are necessary. In this context, research involving more diverse learner groups and game types offers the prospect of establishing if the benefits of participation in gaming identified in the literature transfer to out-of-game contexts. This type of research may provide valuable new insights that contribute to shaping the future research agenda. Fortunately, the promising findings of current research draw attention to a number of areas where additional work appears justified.

One key area highlighted in this discussion concerns the quality of the TL elicited by gameplay. As research shows, this can be highly variable (Reinders & Wattana, 2011). This suggests there is a need to conclusively establish how the types of TL interaction associated with language development in both cognitive and social accounts of SLA such as negotiation of meaning and collaborative dialogue, can be elicited on a sustained basis. In this context, the issue of design assumes critical importance. As has been noted previously, participation in gameplay involving COTS games does not necessarily guarantee positive learning outcomes. Therefore, the modification of game activities to reflect learner needs, proficiency levels, and curricular objectives offers a means to optimize the potential of this type of digital game. As research indicates that positive results regarding learner attitudes can be obtained through game modification (Reinders & Wattana, 2011; 2015a; 2015b), further investigation of this aspect of game-based learning appears justified.

Further issues that are likely to be of interest in future research concern the integration of game-based learning into the wider curriculum and the design of supplementary materials. The findings examined here show that positive results can be achieved when MMORPGs, simulation and adventure games are integrated into regular classroom-based language courses in an appropriate manner (Franciosi et al., 2016; Hitosugi et al., 2014; Reinders & Wattana, 2011; 2015a; 2015b). These findings suggest that additional work in these areas may provide valuable insights into the ways in which educators can maximize the potential of game-based learning. Moreover, studies involving simulation games show that the use of carefully designed supplementary materials may facilitate vocabulary learning (Miller & Hegelheimer, 2006; Ranalli, 2008). These promising results highlight the need for further studies in this area.

In-game and out-of-game social interaction represent additional areas of potential for future research. As research conducted from a social perspective indicates, network-based digital games provide access to TL-rich venues for authentic interactions where learners can participate in game-focused social groups. The research examined here suggests that learners in these groups can undergo socialization that enhances cross-cultural knowledge and skills (Lee & Gerber, 2013; Rama et al., 2012; Thorne, 2008; Zheng et al., 2009; Zheng et al., 2012). Furthermore, as the research analyzed in this discussion shows, commercial MMORPGs enable learners to actively participate in game-based communities of practice (Zheng et al., 2012). These phenomena represent areas of interest for future research.

Another likely area of interest in future research concerns the use of serious games. As was noted at earlier stage of this discussion, it was found that the use of this game type is limited with only four studies identified. However, although infrequent in the literature, research on the use of serious games has yielded positive findings in regards to vocabulary retention in both experimental (Franciosi et al., 2016) and classroom-based projects (Hitosugi et al., 2014). Moreover, this game type also appears to facilitate intercultural interaction and offers opportunities for learners to experience language socialization (Zheng et al., 2009). These promising findings coupled with the expansion in the availability of serious games in recent years, suggest further research involving this type of game is warranted.

A final area that may be a focus of interest in future studies concerns out-of-school gaming. As is noted in the literature (Sylvén & Sundqvist, 2012), young language learners in particular now spend significant amounts of time participating in network-based L2 gaming that occurs outside the confines of educational institutions. Research indicates that for certain learner groups, this type of activity may play an important role in language development (Piirainen-Marsh & Tainio, 2009; Sundqvist, 2015). However, to date, despite the ubiquitous nature of contemporary online gaming, this phenomenon remains under-researched.

CONCLUSION

This review investigated the findings of 26 learner-based studies on the use of digital games in CALL. A limitation of this research was the decision to only include works published in English. As a result, this review does not account for work in this area carried out in other languages. In focusing on peer-reviewed studies that were informed by both cognitive and social accounts of SLA, this review examined the contexts methods and findings relevant to evaluating contemporary research on L2 learning with digital games. As the discussion shows, the findings highlight the potential of digital games in foreign language education. However, as this chapter has shown, the current research base is subject to a number of limitations. Additional large-scale longitudinal studies involving a wider range of game types, proficiency levels, languages and contexts are required in order to conclusively confirm the benefits of participation in digital game-based learning. Further work in this area offers the prospect of revealing valuable new insights into the nature of language learning with digital games.

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KEY TERMS AND DEFINITIONS

Adventure Game: A type of digital game where narrative is used to structure the game play. In this type of game, the individual player assumes the role of a protagonist in an interactive story.

Commercial off-the-shelf game: A commercially produced digital game designed for entertainment.

MMORPG: A type of network-based role-playing game that frequently incorporates a fantasy narrative.

Serious game: A type of digital game designed specifically for educational purposes.

Simulation game: A type of digital game that presents the player with a simulation focused on a real-life scenario.

Chapter 5

Gamification for Technology-Enhanced Language Teaching and Learning

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ABSTRACT

This chapter explores gamification as an innovative pedagogical strategy in language learning with the use of technology. The authors examine the construct of gamification, arguing for the need of a clear definition as many authors use various terms interchangeably. The dynamics, mechanics, and components to conform a gamified learning experience are presented. The chapter describes current research and teaching experiences on gamification and technology-enhanced teaching and learning. Two approaches are identified: the use or design of gamified apps and gamified learning experiences designed entirely by teachers and implemented with the help of different technologies. Some tools and platforms for gamification are discussed and recommendations on how to implement a successful gamified teaching intervention are provided. Two approaches to researching gamification are also proposed.

INTRODUCTION

In recent years, gamification has become a recurrent methodological strategy in the field of education (Kim, Song, Lockee, & Burton, 2018), and the area of foreign language teaching is not an exception (Pujolà & Herrera, 2018; Reinhardt, 2019). There are more and more teachers who, in the search for resources to enhance students' engagement, introduce several elements of games to their teaching together with the use of technology (Goethe, 2019; Siemon & Eckardt, 2017). The origin of this trend

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can be traced back to the vast popularity of video games that caught the attention of experts in different areas of knowledge such as business and education. These experts examined the use of game elements in non-game contexts with the intention of applying them in their own areas (Kapp, 2012; Marczewski, 2013; Werbach & Hunter, 2012). Both the results of these studies, and the emergence of new technological applications have triggered moves toward the implementation of gamification in foreign and second language learning and teaching. Gamification is conceived as a didactic methodology, the central purpose of which is to offer a learning experience that generates students' engagement and interest (Tulloch, 2014).Over time, within the language teaching tradition a wide variety of games have been used for the development of communicative competence (Lee, 1979; McCallum, 1980; Wright, Betteridge, & Buckby, 1984). While the learning goal of these games may vary widely (e.g., prompting authentic oral practice in the process of playing, facilitating vocabulary retention, or providing controlled practice of some grammar points) what they all have in common is that teachers employ them in an attempt to make the learning experience enjoyable.

The use of computer games for educational purposes has also contributed to the integration of playful components in language classes or in virtual language learning environments (Peterson, 2013; Reinders, 2012; Reinhardt, 2017; Sykes & Reinhardt, 2012). Simulation games have been particularly popular in language teaching and learning (Crookall & Oxford, 1990), not surprisingly, given the importance of language use in meaningful communicative interaction for second language acquisition (Canale & Swain, 1980). From the perspective of both psycholinguistic and sociocultural theories of language learning, simulation and computer games hold great potential for language learning in that they engage learners in situations that will allow for negotiation of meaning and/or collaborative dialogue (Peterson, 2009). A different approach has been the development of computer games designed specifically for language learning (e.g., Sørensen & Meyer, 2007). In these educational games, also known as serious games, a specific learning need is targeted and a game is designed around this goal.

In the area of informal learning, there is a growing use of massively multiplayer online role-playing games (MMORPG) in L2 learning (Jabbari & Eslami, 2018; Sundqvist, 2019). In these video game contexts, the actual need to be successful playing them prompts students' motivation and interest to improve their language skills (Thorne, 2008). Different studies have demonstrated that the use of digital games in teaching-learning processes has generated positive effects (Whitton, 2014) such as an increase in students' confidence levels when communicating in a foreign language in digital environments (Reinders & Wattana, 2014), as well as the development of communicative competence (Mawer & Stanley, 2011). Finally, open ended simulation worlds such as Second Life provide tools and objects that can be useful for teachers seeking to design game experiences for their students, and some studies have looked into the potential and benefits of play within these environments (Bell, 2009; Edwards, Rico, Dominguez, & Agudo, 2010). However, the learning curve for their use together with the technological challenges these environments present mean that these venues have not developed as anticipated.

There is a long tradition of the use of games in L2 teaching and learning, which continues to grow as new technologies open up the repertoire of available games. However, the use of games is not the same as gamification; gamification presents a different approach making use of successful game elements and mechanics in the design of teaching and learning experiences. Gamification opens up new opportunities for application in a variety of virtual learning environments (VLEs), from e-learning systems to virtual worlds (Goethe, 2019). Gamification has been undertaken with enthusiasm in the area of education, and its use is also expanding in language teaching and learning. However, there is still little research published in this area.

The scenario described above first requires a clarification of terms and concepts before engaging in a more in-depth discussion of gamification. The following sections describe the main concepts in the use of games and game mechanics, and the main elements of gamification. This chapter then goes on to describe existing gamification experiences in Technology Enhanced Language Learning (TELL), and provides information on the available resources and technologies that can assist teachers gamify their lessons. The chapter ends by offering recommendations on how to incorporate gamification in the teaching of second languages and suggests future lines of research.

BACKGROUND: GAMIFICATION PRINCIPLES

Defining Main Concepts: Gamification / Game-Based Learning / Serious Games

Using playful components for educational purposes can be implemented within different pedagogical frameworks: game-based learning (GBL), serious games and gamification. All three seek to enhance learning experiences increasing levels of engagement. Although the differences in definition of terminology may seem irrelevant in the eyes of the novice practitioner, it is important not to use them interchangeably since the implications for the design of the teaching activity and the analysis and interpretation of the learning experience are considerable. There is, therefore, an imperative need for researchers in TELL to establish a common conceptual ground. The three main concepts are described here within the context of TELL.

1. Game-based learning uses existing games and incorporates them into teaching contexts in order to harness their entertainment elements for the benefits of learning goals. In the context of TELL, these games may require the use of language aspects or communicative competences included in the curriculum, and may therefore provide a practising arena which is enriched with the entertainment and engagement features of games. Here the role of the teacher/instructional designer is to make an informed choice of games that is coherent with the students' learning goals and the nature of their motivation to learn the target language. Digital game-based language learning (DGBLL) refers to the use of GBL based on digital games, that is, games that are played with computers or other electronic devices (Blume, 2019).
2. Serious games are designed with a specific language aspect or communicative competence in mind. They take language learning needs as the starting point and main goal, and entertainment is not the primary objective. Since these games are constructed from the beginning with the sole purpose of language education, they can take into account research findings in SLA and create optimal environments for language learning. The role of the teacher/instructional designer here would be to collaborate with a team of developers and provide content on language learning.
3. Gamification refers to "the use of the elements of the game and design techniques of digital games in a non-game context" (Werbach & Hunter, 2012, p. 26) or "using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems" (Kapp, 2012, p. 10). The goal is to reach higher levels of learner engagement by exploiting the highly engaging features of games, and, in particular, digital games. The role of the teacher/instructional designer here would be to decide what game elements fit learner needs/learning objectives best, and where and when to introduce them into the teaching programme.

These three concepts are captured in Reinhardt and Sykes' framework for the use of games in L2 teaching and learning (L2TL) (Reinhardt & Sykes, 2012, 2014; Sykes & Reinhardt, 2012).In this framework the adaptation of vernacular games to L2TL falls into **Game-Enhanced L2TL**, Serious games for L2 learning are **Game-based L2TL** and the application of theories of game and play to L2 instruction fall into **Game-Informed L2LT**. The latter is close to the concept of gamification, but Reinhardt (2019) clarifies that he uses this term in "a more restricted sense only for those situations where the designer or instructor applies game elements intentionally in ways and contexts they are not normally used, and that the learner can then identify as unusually gameful" (p. 183). An interesting perspective within this framework is the distinction between the intention of the designer of the game or gameful approach that is captured in the concepts of game-enhanced, game-based or game-informed, and the disposition of the player which is encapsulated in the concept of **Gamefulness.** According to Reinhardt (2019) the complement to gamefulness is learnfulness, i.e., the disposition to learn (p.12).

Another attempt at explaining gamification within CALL is Reinhardt and Thorne (2016)'s use of the traditional CALL metaphors of tutor, tool and ecology applied to games. Thus, a game can be seen as a **tutor** if the game itself serves as the instruction medium, as a **tool** if the game is the stimulus or means of learning, or as an **ecology** when we deal with game communities or game worlds where interaction in the L2 takes place. Gamification brings a fourth metaphor, **game-as-method**, referring to the reconceptualization of elements of teaching methodology on the basis of game theories.

It should be noted that in the literature several authors use gamification and game-based learning interchangeably. Using digital or non-digital games, or even roleplaying and simulations in teaching does not provide a gamified learning experience but a pedagogical approach in game-based learning. Gamification, on the contrary, is about motivating the learner to learn actively by introducing some game design elements into a pedagogical design.

Elements of Gamification

The elements of gamification are the essential 'construction materials' which are used 'to build' a gamified learning experience. Werbach and Hunter (2012, p. 81) identify three types of game elements: dynamics, mechanics and components included in Table 1.

Table 1. Summary of dynamics, mechanics and components based on Werbach and Hunter (2012)

Types	Definition	Elements
Dynamics	• aspects of the gamified system that have to be considered but never directly enter into the games.	• constraints; emotions (curiosity or competitiveness, etc.); narrative (a coherent storyline); progression; relationships or social interactions.
Mechanics	• basic processes that drive the action forward.	• challenge; chance; competition; cooperation; feedback; resource acquisition; rewards; transaction; turns and win states.
Components	• the specific instantiations of mechanics and dynamics.	• achievements, avatars, badges, boss fights, collections, combat, content unlocking, gifting, leaderboards, levels, points, quests, social graph, teams and virtual goods.

The most frequently used components in gamification implementations are *points*, *badges* and *leaderboards* (PBL) (Chou, 2015; Mekler, Brühlmann, Opwis, & Tuch, 2013; Werbach & Hunter, 2012; Zichermann & Cunningham, 2011) and are the most commonly cited gamification elements, followed by *rewards* and *avatars* in fourth and fifth place respectively (Exton, 2017, pp. 20-21).

Kapp (2012) distinguishes between two types of gamification: structural and content. The first type refers to a model in which the structure of learning activities is gamified without modifying the content. For example, including a leaderboard so learners can see the points they obtained when performing specific gamified learning tasks. The main objective behind structural gamification is to motivate the student through rewards, the most commonly used being PBL. In structural gamification scenarios, the content does not become game-like. In contrast, content gamification implies altering the learning content to make it more similar to a game or video game, such as the inclusion of a story in which challenges must be overcome to achieve the objectives of the course. In the former type, the playful elements are separated from the content while in the latter, the elements are embedded in the teaching-learning processes that are to be developed.

Rewarding performance is the most common gamification design which often includes one of the components of the gamification triad of PBL. These components can be motivating and can therefore reinforce the learning process depending on how they are designed (Kapp, 2012) and thus, they should be implemented with care (Goethe, 2019, p. 66). However, PBL is not sufficient to maintain motivation and engagement in a constant and sustained manner beyond a specific gamified proposal (Chou, 2015; Kapp, 2012; Marczewski, 2013) as it only affects students' extrinsic motivation, which is generated by the accomplishment of a specific task with the purpose of obtaining an external reward (Ryan & Deci, 2000). A variety of studies in education have presented some short-term benefits of PBL (Attali & Arieli-Attali, 2015; Landers, Bauer, & Callan, 2015; Meckler et al., 2013; Sailer, Hense, Mayr, & Mandl, 2017). However, research on how these game elements increase student performance is still inconclusive.

GAMIFICATION IN TELL (EXPERIENCES AND FINDINGS)

There are a myriad of studies carried out in the last decade that aim to provide data regarding the effects of the use of gamification in educational environments. Some of them point to an improvement in academic results (Lister, 2015), in the effort dedicated to completing tasks and participation (Cronk, 2012; Lister, 2015), satisfaction (Alcivar & Abad, 2016), increasing or maintaining motivation levels (Abramovich, Schunn, & Higashi, 2013; Busse & Walter, 2013) and fostering engagement (Tan & Hew, 2016). Tan and Hew (2016) also observed that adding these elements in university subjects increased participation, motivation and improved the perception and expectations of students about the course. Hamari et al. (2016), in their study of the motivational potential of gamified systems, concluded that they can elicit positive effects both on psychological factors (motivation and positive attitude) and on observable behaviours (learning, effort, and attention). Along the same lines, Li, Dong, Untch, and Chasteen (2013) point out that gamification contributed to the participants having a more proactive and participative attitude. All in all, studies on gamification in education show great promise for future applications. However, there are fewer studies carried out in the specific area of foreign language learning. In the following discussion, gamified experiences in the area of technology-enhanced language learning are reviewed, including both the perspectives of learning and teaching, as well as the use of new technological applications for this purpose. This review leads to the discussion of teachers' needs and continuous professional development (CPD) in relation to the digital competences required for gamification. Finally, a detailed account of a CPD experience led by the authors is provided: the Gamelex course, an in-service gamified teacher training course on gamification and digital competences for language teachers.

In the literature on gamification in foreign language learning a series of studies examine the use of gamified apps in the foreign language classroom, showing encouraging preliminary results. For instance, Perry (2015) studied the use of a quest-based, augmented reality mobile learning tool in a French-as-a-foreign-language course at the university level. She found that students used the target language while interacting with the tool, and reported that they found the application both useful and motivating. Cruaud (2016) also introduced a gamified application in an L2 French course in a Norwegian High School context. She found that students showed expressions of playfulness, autonomy and engagement in their interactions using the app. While these studies are not applying gamification per se into instruction, they can inform the practice of gamification in that they analyse game elements used in serious games and learners' reaction to them.

Gamified language learning apps such as Duolingo or Memrise have also caught the attention of teachers and researchers. These apps have a rather traditional pedagogical approach focusing on grammar and vocabulary and divide their contents into modules, that are similar to levels to be completed in games. Users gain points in order to unlock modules as they progress in their language learning. Points also keep strength bars full in order to encourage students to continue practising, learning and reviewing (for studies on the effectiveness of Duolingo see Exton, 2017; Loewen, Crowther, Isbell, Kim, Maloney, Miller, & Rawal, 2019; Rachels & Rockinson-Szapkiw, 2017; Vesselinov & Grego, 2012). Memrise uses images as a metaphor for the growth of knowledge. Similar to the concept of strength bars, this app uses the image of memory seeds that are obtained every time a word is reviewed and that help a plant grow and flower, and keeps it from fading. Again, the different gamification elements used here help encourage students to continue progressing through the contents of the course (Zhang, 2019).

A different approach is found in studies that report gamified learning experiences designed entirely by teachers and implemented with the help of different technologies. There are very few examples in the literature to be found, since this is an emerging practice, and many of the experiences are shared in conference proceedings or blogs. One example is described by Vallejo (2018), who carried out a gamified didactic experience aimed at vocabulary learning in an adult EFL class. In this gamified intervention, teams of students competed to gain the most points in completing a route around the UK which was divided into a number of stages, all of them linked by a narrative based on the famous reality TV game 'Pekin Express.' It included different mechanics combining individual and group activities, cooperation within teams and competition amongst them. In her study, Vallejo (2018) focused on affective factors and found that gamification applied to vocabulary acquisition in adult education helped foster intrinsic motivation since it lowered anxiety, enhanced perceived competence and helped create positive group dynamics.

Stockwell (2019) gamified vocabulary and listening mobile-based learning activities using an intelligent online tutor system to determine what factors may play a role in enhancing learner engagement. Competition and leaderboards were the main gamification strategies employed. Results only showed a slight increase in the number of activities completed, whereas the main impact was a considerable increase of time spent on each of the activities. Stockwell also found the competition element appeared to impact upon the nature of the engagement, adding both emotional and social aspects, and on the sustainability of task engagement. Lam, Hew and Chiu (2018) reported similar results when they introduced gamification in the form of points and leaderboards in a blended learning intervention using Edmodo to improve secondary school students' argumentative writing: students' online contributions were of significantly higher quality. These two studies that are clear examples of structural gamification, demonstrate that by introducing PBL elements into existing teaching practices, it is possible to enhance the conditions favourable to learning and obtain better results.

Most studies of gamification mainly focus on the use of PBL whereas content gamification is present to a lesser extent. Content gamification is more complex to implement as it uses an intricate combination of gamification elements which are threaded together by a narrative. An example of this approach is reported by Acedo (2019). He implemented a gamification project entitled "*La liga de la justicia y los superheroes españoles*" (Justice League and Spanish superheroes) whose objective was to recover the superheroes' lost powers and defeat the villains that exiled the students to an isolated island. By means of resolving language tasks collaboratively and using different ICT tools students could regain all their superpowers. This gamification project includes many gamification elements tied together with an appealing storyline and is well-integrated into the language curriculum. While Acedo (2019) did not examine the effect of this gamification design on the students from a research point of view, he reports positive impressions and sees great potential.

In a different context, Sevilla-Pavón and Haba-Osca (2017) describe an original approach to combining gamification and telecollaboration. They describe the experience in an EFL/Spanish Business telecollaboration project at university level, which was gamified through the use of points, leaderboards, avatars, reward systems, quests, social elements and social media. They collected student perceptions of the gamified telecollaboration experience and concluded that students showed positive attitudes towards the project and high levels of engagement. Even though the study results did not attempt to separate the effects of telecollaboration and gamification on student perceptions, the fact that there were high levels of engagement is a promising result for telecollaboration task design, taking into account that sustainability of engagement in this type of projects can often be a challenge (Helm, 2015).

In the area of CPD, the Gamelex project carried out a gamified in-service teacher training course on gamification and digital competences for language teachers (Pujolà, Berríos, & Appel, 2017) where participants designed gamified language teaching interventions with the support of a tutor. To start with, the teacher trainees took a six-week online gamified introduction to gamification in TELL. The narrative revolved around an intergalactic mission to find a vaccine that would cure an inability to learn foreign languages. Different planets, each with its own inhabitants and encoded language, were stages in this intergalactic journey that contained readings and tasks that helped students learn about gamification principles and tools. The narrative metaphors, such as the spaceships for each group, and the roles, such as spaceship captain or engineer, kept participants immersed in the story as they unlocked planets and reached a point in which all groups had to collaborate in order to save the world from the inability to learn foreign languages. After this experience as students of a gamified course, teacher trainees designed and implemented a gamified didactic intervention (GDI). Some teachers reproduced the intergalactic metaphors in the original teacher training course exploiting well known narratives such as *Stargate* to immerse their EFL students in collaborative tasks with students of English in other language schools. In doing this teachers resorted to a variety of technologies such as Kahoot!, Quizlet, the YouTube video editor, Padlet or video recorders in Smartphones. Another ingenious example from the GDI's that were designed in Gamelex was the gamification of a whole L2 French course for adult learners, based on a real murder story that had become well known through the movie *Omar m'atuer*. The starting story in the GDI was that a murder victim had left a letter full of language errors. Students collaborated in analysing the errors in a forensic linguistics manner, and the results led them to discover who the murderer was. Aside from these examples, the vast majority of GDI's designed and implemented by the teacher trainees stayed within the limits of structural gamification making an intensive use of PBL.

Results about the effects of gamification through the use of ICT in language learning and teaching are as yet inconclusive. However, the positive results to date discussed in this section give reason to foresee an increase in the implementation of gamification in language education. In this regard, teachers need to become aware of the affordances that gamification offers for enjoyable language learning experiences and require training to develop effective gamified teaching interventions. In the following section, some guidelines and recommendations are suggested.

SOLUTIONS AND RECOMMENDATIONS

Implementing Gamification in Tell

When considering a gamification approach to language teaching, educators need to address medium and long-term lesson planning, rather than focusing on developing isolated gamified tasks. To build a learning gamified ecosystem, it is crucial that teachers try to work with deep level gamification (Marczewski, 2013), beyond implementing just PBL. This deep gamification aims at students' intrinsic motivation and thus, will ensure their motivation for learning last longer. In this sense, teachers should use a variety of game elements and negotiate with their students what kind of mechanics fit their learning needs best. In this regard, there are two approaches that teachers can follow: using gamification tools that are already designed to manage the gamified learning experience or gamify the course using a variety of technological tools and apps.

Gamification Platforms and Tools

There are a variety of platforms, apps and tools for teachers to use when implementing gamification in their language teaching. Two categories can be established: gamification platforms that help to set up and manage gamified lessons or entire courses, and gamified quizzes that help teachers improve lesson interaction and also build gamified tests for assessment purposes. Another gamification option is to include game-like features in regular VLEs.

Gamification Platforms

The following four platforms can help teachers gamify a whole course:

- **Classcraft**[1] is a platform that resembles a video game of the 'World of Warcraft' type and allows teachers to create a world of characters —Mages, Healers and Warriors with unique set of powers— who must cooperate and participate in missions in order to earn points and gold for their teams. Teachers can use the platform to teach concepts through a gamified storyline and transform their classes into a learning space to encourage students' collaboration. The objective is to progress collaboratively while learning and developing their knowledge (Sanchez, Young, & Jouneau-Sion, 2016).

- **ClassDojo**[2] is a free virtual classroom management web or mobile app that serves as a digital token economy system (Saber, 2017). Teachers can customize the environment to assign avatars to students, to specify target behaviours, and assign and award points as students perform the expected behaviours and post messages to encourage review of student progress. ClassDojo can be used as an effective method for tracking data (Rivera, 2019) as points awarded are easily monitored.
- **GradeCraft**[3] developed by the University of Michigan to support gameful courses, allows students to set their own goals, earn badges and stay informed about their learning analytics throughout the class (Holman, Aguilar, & Fishman, 2013). Students can choose either to participate in anonymous, team-based leaderboards if they like competition, or opt out if they do not. Teachers can also determine what tasks must be carried out before students can unlock the next set of material for them to reach their next goal.
- **Rezzly**[4] is a gamified learning management system in which teachers can design quests and badges to personalise their students' learning. As students complete quests, they will earn experience points, ranks, achievements, awards, and badges.

Goshevski, Veljanoska and Hatziapostolou (2017) provide a thorough review of the following gamification platforms: ClassCraft, Rezzly, Seppo, Youtopia, and also Kahoot!, which will be examined in the next section.

Gamification Quizzes as Personal Response Systems

Kahoot!, Socrative, Quizlet or Quizziz, to name just a few, are mobile applications that can be used as clickers, Personal Response Systems (PRS) that provide instant feedback and can be used in a lesson to assess students' knowledge or opinions and to encourage interactive lessons. Kahoot! and Socrative have different game-like tasks, self-paced or timed, and can be played individually and in teams. Both include similar gamified tasks that keep track of students' points, in which students' ranking is based on response time and accuracy of their answers. Most of these apps are used for assessment purposes where teachers try to engage their students in a competition as if they were the contestants in a game.

Drawing from three different uses of Socrative, Faya Cerqueiro and Martin-Macho Harrison (2019, p.16) conclude, as other authors (Dakka, 2015), that PRS such as Socrative increase students' motivation, interactivity, participation, satisfaction, interaction, performance and engagement; they are also helpful for feedback and formative assessment and encourage collaborative learning. In the field of language education, some studies using Kahoot! report positive results mainly in terms of students' motivation and from a teaching perspective, its facilitation of revision (Veljković Michos, 2017; Wichadee & Pattanapichet, 2018). Similarly, Vasconcelos and Balula (2019) report a positive effect in motivating students and promoting engagement using Socrative in two German courses.

Gamifying VLEs

Another approach to gamify a language course, either in distance or blended learning, is to include the game-like elements into VLEs such as Moodle or Edmodo. Both include, for example, the gamification feature of awarding badges. With the core features of Moodle teachers can gamify their courses by using a scoring system within the Gradebook tool, or the Choice activity option to help learners set their own goals or even to ensure progress by restricting students' access so they have to unlock content (Denmeade, 2015). Besides, several plug-ins can be added for gamification purposes such as progress bars, leveling, ranking blocks and leaderboards. For instance, the Stash Plugins are a combination of plugins, allowing teachers to reward students' achievement with virtual items, such as a coin or a key. Another plugin, Level up!, gives points to students for their actions automatically and displays their current level and progress towards the next level.

Gamifying the Language Class with ICT Tools

Apart from using platforms and tools available for gamification described above, language teachers can devise gamified language lessons or courses using a diverse range of ICT tools and resources. Pujolà and Herrera (2018) suggest some language tasks in relation to the gamification mechanics and components, such as students building their own *avatars* from which the rest of the class should identify who is who, designing *missions* in which learners should identify the pattern of a verb tense or reaching an *achievement* in the form of a final language product. Some of these tasks can be carried out using technologies that help teachers develop students' communicative digital competence in order to make them efficient communicators in virtual environments or online.

Table 2 illustrates some possibilities of implementing gamification components (and their corresponding mechanics) using a variety of ICT tools, apps or resources.

Table 2. Introducing gamification components and mechanics using TELL

Mechanics	Components	Task	ICT tools/apps/resources
Identity	• Avatars	• Students design their own avatars; they are all presented to the whole class and students guess who is who.	• Voki: https://www.voki.com/ • Avatar Generator: https://www.generateit.net/avatar-generator/
	• Logos/Emblems	• Students define the common characteristics of their teams and embody these in the logo designs. Students present the logos in class.	• DesignEvo: https://www.designevo.com/logo-maker/
Challenge	• Achievements	• Students make an infographic (as an intermediate or final product) on a language topic as a challenge.	• Canva: https://www.canva.com/
	• Missions	• Students identify a secret code in a video by answering comprehension questions. (Teachers should create the code with the correct answers)	• Edpuzzle: https://edpuzzle.com/ • PlayPosit: https://go.playposit.com/
	• Secret Missions	• Volunteer students carry out an activity unknown to the rest.	• Teachers can use any digital communication tool to inform selected students.
Competition & Cooperation	• Combats	• Students in teams devise their own Kahoots! for revision purposes at different points in the course. Points or badges are awarded.	• Kahoot! https://kahoot.com/
Cooperation	• Teams	• Organize an Educative Escape Room or breakoutEdu (https://www.breakoutedu.com) so students in groups have to cooperate to succeed in getting out.	• ICT for designing puzzles, QR codes or any m-learning app to be used to solve them. • If teachers opt for breakout.edu, consult: https://www.breakoutedu.com/
Rewards	• Badges	• To organize a badge system to reward attitudes or skills in performing some tasks.	• Teachers can use Makebadges to design badges to be included in their VLEs: https://www.makebadg.es/ To get track of badges: • Flippity Badge Tracker: http://www.flippity.net/ or • ClassDojo: https://www.classdojo.com/
Feedback	• Points and Leaderboards	• Establish a system of scoring to measure the development and achievement of students' tasks.	To manage points and leaderboards, teachers can use: • Pointagram: https://www.pointagram.com/ or • Flippity Progress Indicator: http://www.flippity.net/

All the elements do not need to be included in a gamified language teaching intervention but most importantly it is recommended that the gamification elements chosen should be assembled coherently by choosing an enthralling storyline or narrative with the intention to engage students and provide them with an exciting gamified experience.

Following are some recommendations for the implementation of gamification in TELL:

- Start small: it is advisable to start by gamifying a unit or a lesson and then assess its implementation and to what extent your students and you benefited from the experience.
- Make it simple, so students know what they have to do at every moment. You may invest a lot of time on an intricate set of game rules or storyline, but when you first present it to your students it is crucial that they understand what is expected from them.
- Be sure you know what you are gamifying, and what objective(s) should be attained. Do not gamify for the sake of gamifying. Identify a reason for gamifying (low levels of engagement, high drop-out rates, poor learning results, lack of contact with the language outside classroom hours, etc.).
- Once you are clear on your objectives choose the gamifying elements (dynamics, mechanics and components) that best fit them. Do not feel compelled to use them all.
- Do not force anybody “to play” the gamified experience. Always have an alternative plan in place for those students who do not want to participate. Nobody can be forced “to play a game” they do not want to play.
- Take into account your student’s interests, negotiate with them. You are trying to get their attention, no matter how appealing you find your design, if it fails to engage students it will not succeed.
- Select carefully which elements of PBL will work best in your own setting and with your students
- Consider integrating gamification elements in addition to PBL, taking into account students’ needs and game preferences you will devise tasks that can appeal to your students’ intrinsic motivation.
- Consider using a narrative that interests your students.
- Plan carefully the mechanics of collaboration since collaborative learning has been shown to develop higher-level thinking skills in students (Johnson & Johnson, 1989).
- Choose the appropriate ICT tools and platforms that will help you to manage the gamified teaching intervention and help students develop their digital communicative competence.
- Finally, make sure you gather data from the gamified experience by means of questionnaires or students’ reflective reports so you can use them to improve your gamified intervention for a subsequent iteration.

The use of ICT apps and tools plays a key role in the design of gamified learning experiences, which means that teachers will also need to learn about the latest available tools for more innovative practices. New tools will enable greater possibilities but what matters is to understand how new emergent technologies can widen the possibilities. This is only possible if one understands the nature of gamification when applied to language learning and teaching, and the benefits in the design and implementation of gamified learning experiences. Gamified teaching practices should be accompanied with consistent research on gamification in TELL to shed light on its learning effectiveness.

FUTURE RESEARCH DIRECTIONS

It is essential that studies in TELL distinguish research on serious gaming from gamification research since these are two different didactic approaches. Gamification research will continue to report small scale studies in which teachers investigate the outcomes of their own teaching as happens with most TELL research studies (Stockwell, 2019).

The limited current research on gamification highlights its benefits in increasing student engagement, which, in turn, can result in better learning outcomes. However, there are still limited conclusions that can be reached as to which gamification elements or factors contribute to engagement or enhance learning. At this early stage of gamification research two main methodological approaches can be suggested:

a) Study the impact of specific gamification elements on language learning through replication studies (Porte, 2012). Replication studies in education will never follow an exact replication but an approximate one in which some conditions are altered such as time of exposure, participants, or the inclusion of a different gamification element. This research approach is often difficult from a methodological standpoint and experimental studies of this kind are problematic and should be carried out with precise control and care because a variety of factors can influence the results. Through well designed replication studies teachers will be able to test reliability and generalizability of their findings.

b) Follow a context-sensitive methodology such as design-based research (DBR). This type of research is more holistic in nature and its aim is to improve educational practice incorporating an innovation (Reeves & McKenney, 2013) such as gamification. This type of research allows for iterations in which teachers can incorporate changes based on the analysis of a previous implementation. The DBR approach promotes close collaboration between practitioners and researchers meaning that research results have an immediate impact on teaching practices.

Research on gamification in language teaching and learning has mostly focused on engagement and affective factors. Studies that explore language development such as the four skills, or learning gains in language areas such as lexis or grammar are also necessary in order to improve the design and implementation of gamification. Researching gamification in TELL will help teachers use gamification elements in a more appropriate manner which will result in a more enjoyable and effective teaching and learning process.

CONCLUSION

Education in general and more specifically language teaching and learning is currently in search of new methodologies that will address millennial students’ new expectations in terms of autonomy, freedom of choice, active learning and relevant contents. Gamification can assist teachers in this quest as well as game-based learning, simulations, or serious games, which aim to increase learner engagement. However, if experiences, best practices and research results are to be disseminated effectively and applied efficiently, it is important to be aware of the difference in concepts. Gamification is not a magical formula, but if applied correctly, with a goal in mind, taking students’ preferences and needs into account, it may help teachers improve student engagement, retain knowledge and ultimately improve learning outcomes.

Gamification is also a feasible strategy for teachers, that does not require the kind of investment game development does, with a handful of resources and a spark of creativity it can bring positive results that will infuse teaching and learning with renewed energy and engagement. Gamification in language learning is a pedagogical trend to stay, and thus, more research is needed on the effects of gamification in TELL as regards to engagement, linguistic performance and learning gains.

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KEY TERMS AND DEFINITIONS

Game-based learning: The use of digital or non-digital games with the aim to fulfill one or more specific learning objectives.

Gamefulness: The experiential and behavioral quality of a game.

Gamification: A process in which people make use of the thinking and mechanics behind games in non-game contexts.

Gamification Components: The specific instantiations of gamification mechanics and dynamics.

Gamification Dynamics: Aspects of the gamified system that have to be considered but never directly enter into the gamification.

Gamification Mechanics: Basic processes that drive the action forward.

Serious games: Games that are designed with a specific learning objective in mind.

ENDNOTES

[1] https://www.classcraft.com/
[2] https://www.classdojo.com/
[3] https://www.gradecraft.com/
[4] https://www.rezzly.com/

Section 2

Practical Applications

Chapter 6

Investigating Learner Autonomy and 21st Century Skills in Blended Tech-Enhanced Language Learning

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ABSTRACT

This chapter reports on a study that examines learners' beliefs towards technology use with specific focus on the development of learner autonomy in a blended context within a post-secondary English for academic purposes (EAP) program. The growth of post-secondary EAP programs along with the researchers' awareness and interest in leveraging technological tools in support of student-centered learning motivated this research. Findings reveal students' overall positive attitude towards technology use and adoption of some 21st century skills in learning English. When innovative pedagogical methods are supported by intervention in learning, a heightened critical awareness and movement towards learner autonomy was observed among students through fostering of some 21st century competencies. The chapter concludes with recommendations for teacher education in tech-enhanced pedagogy, teacher-intervention in educating students about the rationale for technology use, leveraging students' digital resources and ongoing critical and reflective teaching practices.

INTRODUCTION

Over the past fifteen years, both Canada and the U.S. have seen dramatic increases in international student enrolment in post-secondary institutions (Statistics Canada, 2016). This intense internationalization of higher education further incites the need for growth of crucial post-secondary English language programs within the North American and American context specifically. On the one hand, technology-enhanced programs are an emerging strategy to support such growth and, on the other, educational technology

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incorporation can benefit English language learning by enhancing learner autonomy, language output, collaboration, learning communities and the development of 21st century skills (Kessler, Bikowski & Boggs, 2012). Autonomy is defined as "a precondition for effective learning; when learners succeed in developing autonomy, they not only become better language learners, but they also develop into more responsible and critical members of the communities in which they live" (Benson, 2011, p. 1). In keeping with this statement, the study investigated whether the technological components used in learning English paved the way towards more independent and self-sufficient learning "exceed[ing] the designers' [the EAP teacher's] original intentions . . . [and] leading to new ways of teaching and learning" (Hanson-Smith, 2000, p. 2, as cited in Benson, 2011, p. 149). Furthermore, the study explored Benson's (2011) autonomy framework to see whether students' believed to have "use[d] technology to learn content and skills – so that they know *how* (original italicized) to learn, think critically, solve problems, use information, communicate, innovate and collaborate" (Dede, 2010, p. 56) as these activities are essential components of 21st century competencies. The development of learner autonomy is deeply connected to the growth of these 21st century competencies that help build global citizens who are equipped with "learning and thinking skills," "information and communications technology (ICT) literacy," and "life skills" (Dede, 2010, p. 58). That is why it is important to observe these skills being adopted towards a successful and meaningful language learning curriculum and pedagogy. The blended learning (BL) environment on the other hand, is able to accommodate various learning styles and modes that complement individual and collaborative technology-enhanced learning practices and is in sync with the development of 21st century skills and learner autonomy. Hence arises the need for research of such components and contexts.

Benson (2011) believes that autonomy related gains in learners' ability to learn languages involve questions like, whether the learners are able to interact with authentic target language texts, whether the learners are able to create situations of learning for themselves and whether the learners are able to monitor and self-assess their own performances. Although reliable testing instruments to measure abilities of this kind have yet to be developed, "evidences of ability to learn can often rely on direct observation of learners' at work, on analysis of records of work and learning outcomes, or on learners' self-report" (Benson, 2011, p. 211). In an effort to explore these aspects of autonomy, this research applies a multi-phased, partly grounded-theoretical approach involving complementary data sources including two online surveys conducted at the beginning and at the end of the program, class observations, individual students' digital diary (DD) writing, stimulated recall (SR) interviews, focus group (FG) interviews and teacher interview. Benson's (2011) learner autonomy framework is used to investigate students' interactions and teacher practices with the six approaches in order to categorize areas where technology appears to facilitate autonomy and also influence learner beliefs about tech-enhanced language learning.

THE BLENDED LEARNING ENVIRONMENT (A DEFINITION)

Understanding the blended context is pertinent to this study, because the EAP course that is the subject of this research fits the definition of a blended environment, where a lot of the teaching and learning activities took place online as well as face-to-face (FTF). Also, it will provide an understanding of the extent and nature of use of specific tools in and outside of the classroom that shaped students' beliefs. Singh and Reed (2001) from a corporate software development perspective, highlight optimizing the learning outcome and cost of program delivery through adopting the BL approach. They believe that

Blended learning focuses on optimizing achievement of learning objectives by applying the "right" learning technologies to match the "right" personal learning style to transfer the "right skills to the "right" person at the "right' time. (p. 2)

According to Singh and Reed (2001), the following principles are embedded within the above definition:

- Focusing on learning objectives rather than the method of delivery
- Supporting different learning styles to reach broad audiences
- Bringing in individual and different knowledge into the learning experience
- Embracing the most effective strategy of "just-what-I-need, just-in-time."

Of the five dimensions of BL they introduce, the offline and online learning dimension seems to be a fit for this study context. Within this dimension, a learning program is described as "providing study materials and research resources over the Web while providing instructor-led" sessions as the main medium of instruction (Singh & Reed, 2001, p. 2). Bueno-Alastuey and Lopez Perez (2014) believe that BL involves combining FTF classes with computer-assisted language learning (CALL) modules in search of the most effective and efficient combination for individual learning subjects, contexts, and objectives. The types of blend can vary ranging from approaches which only include web-based activities for homework that is often known as web-enhanced (Sagarra & Zapata, 2008), to approaches which offer a full integration of CALL with online activities and computing technologies complementing FTF tasks also known as hybrid (Bueno-Alastuey & Lopez Perez, 2014). Despite these perceived differences, Whittaker (2013) argues that many of these terms are synonymous and that in English language teaching, BL is the most commonly used to refer to any combination of FTF teaching with computer technology (online/offline activities/materials). This last definition of Whittaker (2013) is the one that fits the BL environment that has been observed in this research context.

LANGUAGE LEARNERS' BELIEFS TOWARD BLENDED LANGUAGE LEARNING: BENEFITS

Studies have identified key areas that have been reported to influence learner beliefs towards a BL approach. For example, reasons such as students' previous experience with educational technology, convenience of the delivery format, multiple attempts, individualized learning, immediate feedback options, enjoyment factor of learning and initial learning curve have been reported to have impacted students' beliefs' in learning language within a BL environment. Sagarra and Zapata (2008) looked at Spanish as a second language being taught in a BL approach. The students reported having enjoyed using a myriad of formats that allowed them multiple attempts, individualized immediate feedback, and self-paced work within the online environment. Stepp-Greany (2002) reported a number of benefits acknowledged by students of Spanish as a second language: increased motivation, improvement in self-perception and mastery of basic skills, more student-centered learning and engagement in the learning process, and more active processing, resulting in higher-order thinking skills and better recall. Students also claimed to have gained confidence directing their own learning. Students perceived that they had learned the most from that which they had enjoyed the most, attributing both a learning and interest value to the use of a computer lab for learning Spanish. Benefits reported by Iranian EAP students in the Atai and Dashtestani's (2013) study examining BL included up-to-date information, the use of various materials in learning, comprehensive information, time being saved, and easy access.

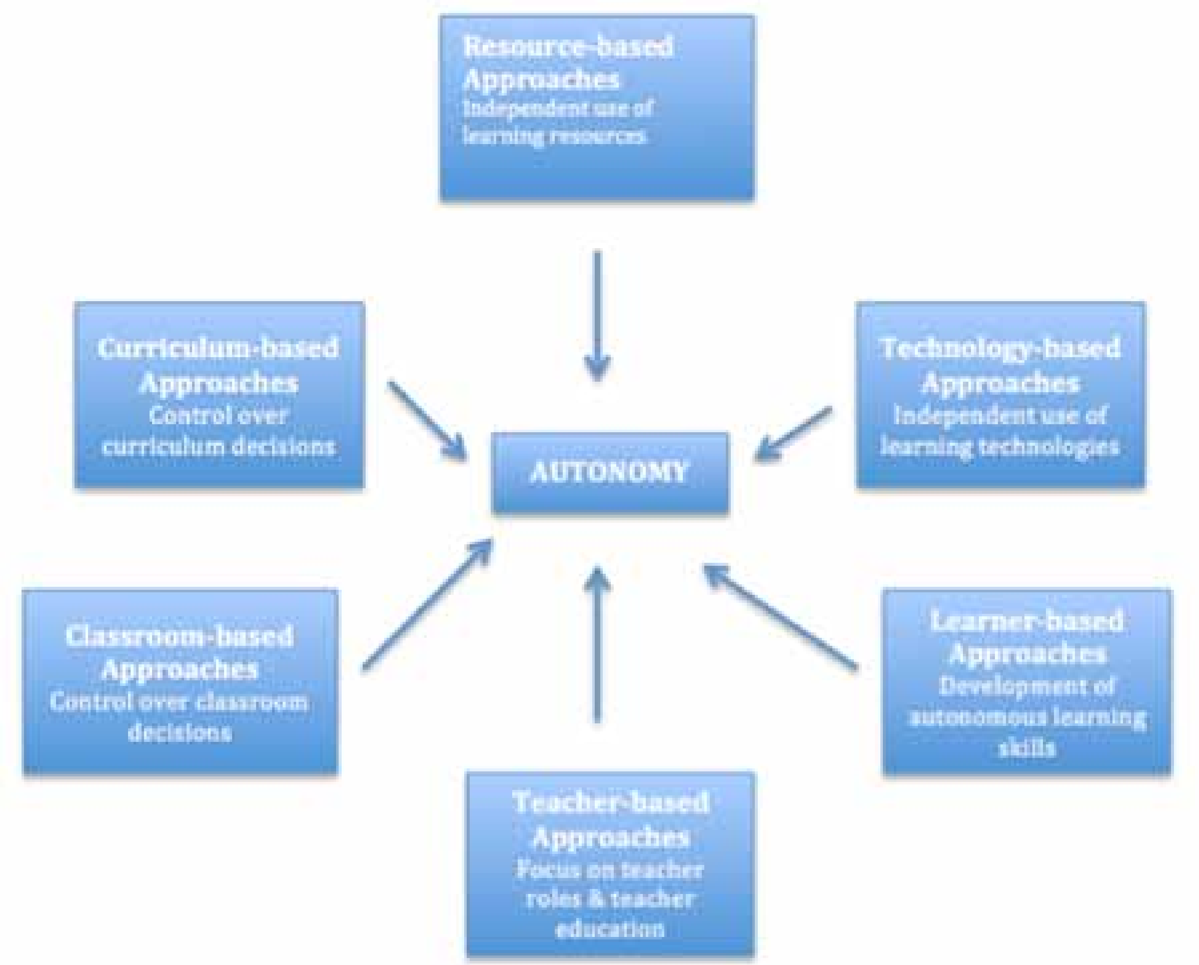
LANGUAGE LEARNERS' BELIEFS TOWARDS BLENDED LANGUAGE LEARNING: CHALLENGES

Concerning participants' perceptions on the limitations of using the internet in EAP courses, the majority of the participants identified "slow internet speed," "unfamiliarity with major academic websites," "inadequate Internet-based facilities at university," "inadequate Internet-based skills," "low credibility of the content of free websites," and the "high cost of connecting to the internet" (Atai & Dashtestani, 2013, p. 34). Aubrey (2014), who looked at 44 Japanese students' reactions to using Google Docs in EFL writing, reported challenges in internet accessibility and the learning curve as being issues with "a new technology." Prihatin (2012) studied instructors' integration of computer technology in two universities in Indonesia and reported "limitations of facilities, students' social background, and confidence in using technology" (p. 150) as major challenges impeding a smooth implementation of technology in English education. In teaching, teachers seem to lack the support and encouragement to use contemporary, familiar CALL technologies on the one hand; technologies that facilitate learner-centered instruction are also lacking on the other (Kessler, 2018). That is why Kessler's (2018) call for education to be "refocus[ed] with the learner as the point of leverage – for example, by attending to students' learning styles or helping learners to develop awareness of how they best learn" (p. 209) is very timely and in line with the learner-centered approach of this research.

THEORETICAL FRAMEWORK OF THIS STUDY

Two complementary theoretical frameworks that inform this research are outlined in this section. EAP education in the digital age calls for new pedagogical paradigms that can assist learners to develop new literacies and "21st century skills" (Dede, 2010) that are required for successful communication in academic and professional contexts (Kuteeva, 2011). Twenty first century EAP learners according to the revised conceptual framework for digital literacies proposed by Dede will be required to exhibit leadership for digital citizenship, develop cultural understanding and global awareness by engaging with learners of other cultures using technology. Furthermore, they will be able to evaluate and select information sources and digital tools based on the appropriateness to specific tasks, use multiple processes and diverse perspectives to explore alternative solutions and above all transfer current knowledge to learning of new technologies (Dede, 2010). The development of 21st century skills among EAP learners is thus observed through investigating students' beliefs towards the role of technology in their language learning, and the role of the teaching methods and activities carried out in the BL environment. Students are reported to have developed a heightened critical awareness towards their learning, thinking, selecting and using applications effectively and productively that are part and parcel of International Society for Technology in education ICT skills (Dede, 2010). The emergence of 21st century skills leads to fostering autonomous learners whom Kumaravadivelu (2001) terms as the "postmethod learners." The postmethod learner is an autonomous learner who is willing and able to take charge of his/her own learning (Kumaravadivelu, 2001). With the help of their teachers and peers and the careful planning and integration of EAP technology tools (Yim & Warschauer, 2016), postmethod learners can enhance academic, social and liberatory autonomy (Kumaravadivelu, 2001) through exploiting technology-enhanced tools in a blended approach. This notion of the postmethod learner may contribute to understanding students' behavior in this study, their attitudes shaping their belief systems. Additionally, EAP students' interactions with the six approaches proposed by Benson (2011) is explored (see Figure 1) to categorize areas where technology-enhanced language learning (TELL) appears to facilitate autonomy and influence learner beliefs about language learning using technology.

Figure 1. Benson's framework for autonomy in language learning and related areas of practice
Source: © [2011] [Taylor & Francis Group]. Used with permission.


Resource-based Approaches
Independent use of learning resources
Curriculum-based Approaches
Control over curriculum decisions
Technology-based Approaches
Independent use of learning technologies
AUTONOMY
Classroom-based Approaches
Control over classroom decisions
Learner-based Approaches
Development of autonomous learning skills
Teacher-based Approaches
Focus on teacher roles & teacher education

- Resource-based approaches emphasize independent interaction with learning materials. Resource-based approaches serve as an umbrella term for approaches such as, tandem learning, distance learning, self-instruction, and out-of-class learning, that tend to build learners' independent interaction with physical, human or digital language learning resources (Benson, 2011).
- Technology-based approaches emphasize independent interaction with educational technologies. This approach is not only inclusive of out-of-class learning under resource-based approaches, but also highlights exclusively autonomous learner interaction in TELL environments.
- Learner-based approaches emphasize the direct production of behavioral and psychological changes in the learner.
- Classroom-based approaches emphasize the learner control over the planning and evaluation of classroom learning.
- Curriculum-based approaches extend the idea of learner control over the curriculum as a whole.
- Teacher-based approaches emphasize the role of the teacher and teacher education in the practice of fostering autonomy among learners.

The above approaches will be addressed individually to gauge the extent of learners' autonomy through learners' interaction and subsequent evolution in thinking, strategy use and behavioral change in learning English that may have taken place within these specific approaches in the current study.

THE STUDY

The Research Context (Course, Teacher and Students)

This was an English language course under the academic program of a university situated in a large metropolitan area in Canada. It was an eight-week English language program, designed to provide an intensive learning experience for university-bound students who had scored IELTS 5.5 or equivalent (CLB 6) in their English language tests. The course entails intensive work on academic reading, writing, listening and speaking skills in English. Students are also expected to achieve some specific sociocultural and sociolinguistic skills. These include awareness of cross-cultural issues, awareness of different socio-academic constructions of knowledge, showing respect and openness to the points of views of others and participating in out-of-class social and cultural experiences as included in their course syllabus. The minimum passing mark for this course is 65% in each of the four skills (i.e., reading, writing, listening and speaking) including obtaining separate passing marks for the final research project components (essay writing and oral presentation). The TELL tools observed being used in this classroom were unique to this specific class. The use of these tools was not required by the institution, rather they were chosen by their course teacher (see Table 1 for details on tools and activities).

Table 1. Tools used and activities carried out in the EAP course

Tools used	Activities
• Google Drive (individual folders of students)	• Save, exchange and share all written work, assignments, essays
• Google Doc	• Compose all written work in and outside of class; teacher shared and posted all feedback to written work; peer and teacher editing done simultaneously
• Google Slides	• Compose all presentations collaboratively/individually, also shared for teacher feedback
• Google+ Community	• Post and share student created videos made outside of class (3 videos per student, per term), all students were encouraged to comment on their classmate's videos
• Google+ Hangout	• All teacher-student and student-student communication; all announcements, changes in schedule, plans shared/exchanged; students contacted teacher instantly (if any question)
• Google+ Map	• A quest was designed for students to find individual locations assigned and video record the journey, post on their Community, comment on each other's posts

Teacher Background

In this particular study, the teacher is at the forefront of designing, modifying, altering and influencing students' beliefs as can also be seen from the tools used and activities undertaken in this class. The teacher plays a significant role in any tech-mediated classroom (Johnston & Lawrence, 2018; Knobel & Kalman, 2016) and that is why it is important to provide background information on the EAP course teacher Pierre (pseudonym used). This will assist in developing a better understanding of the EAP context of this study.

Similar to many of the Canadian course teachers at that institution, Pierre had teaching experience at home and abroad (Japan, Korea). What sets him apart though is his unique passion for developing programs and designing online course materials, textbooks and curricula. His MA degree in applied linguistics and a book chapter that he co-authored, on using web-based technologies in collaborative writing in an EAP context, appeared to have played an important role in shaping his beliefs and tech-enhanced practices. This is reflected in the core of integrating and exploiting the various Google extensions and in the way he did in this specific course.

Student Participants

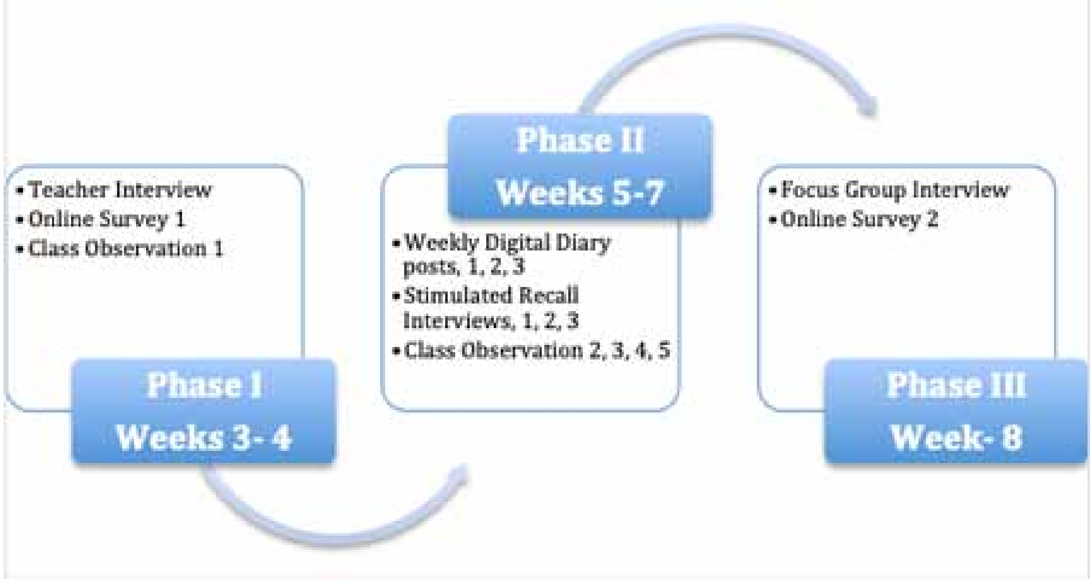
There were a total of 16 students (9 male and 7 female) in the class and all participated in the study. All of the learners were between 18 to 20 years old. They were all from China and educated until high school in China. In terms of learning English in a school setting, on average, students had been learning for over 5 years. A few of the students also had experience of being educated in international high schools in China with English as the medium of instruction. Almost all the students identified their level of English language as Intermediate (CLB level 5-6).

The Design of the Study, Research Instruments and Analysis

This study adopted a multi-phased, qualitative approach – combining online student surveys, DD posts with SR interviews and semi-structured FG interviews – in three phases within eight weeks to elicit and analyze students' experiences of tools used in learning language and perceptions as a language learner progressing through the course. Given this study's focus on the development of learner autonomy and 21st century skills; documenting students' beliefs, reflections, and perceptions very closely as users of educational technology in EAP, a qualitative analysis was used. This approach helped to contextualize the use of tools (see Table 1), identify patterns of skills developed, and understand how beliefs evolved due to usage.

Two online students' surveys were conducted using Google Forms at the beginning (Phase I) and at the end (Phase III) of the study. The researcher went into the classroom a week prior to administering the survey in order to provide an orientation. The phase I data was fully analyzed to refine approaches and queries in the following phase II. Similarly, phase II data of the DD posts followed by the SR interviews were transcribed and analyzed fully by the researcher to refine queries for phase III of the study (see Figure 2 for details). This particular aspect is inspired by the grounded theory method (GTM) which "is designed to encourage researcher's persistent interaction with their data, while remaining constantly involved with their emerging analyses. Data collection and analysis proceeded simultaneously and each informed and streamline[d] the other" (Bryant, 2014, p. 125). This iterative process of going back and forth between empirical data and emerging analysis makes the collected data progressively more focused and the analysis successively more theoretical. There was a total of three DD posts followed by three SR interviews. The SR interviews were all conducted using Screencastify that is an extension one can use within Google Chrome to record screen activity for creating tutorials and online interviews. The goals of the SR interviews were to verify and elaborate on the recorded observations made by students in their DD posts of specific tool use. All interview data were recorded and then fully transcribed by the researcher and all the transcribed data as well as online survey and DD posts were reviewed, seeking recurring patterns, corroborating and disconfirming instances to ensure reliability (Stake, 1995). Other data sources such as, course syllabus, teacher interview and class observations were used to interpret, analyse and triangulate themes and findings. NVIVO 12 was used to come up with the themes and cross reference findings across various data sets for comparison purposes.

Figure 2. Data collection plan and tools



FINDINGS AND DISCUSSION

The findings below are organized under themes identified through the analysis of students' beliefs as they were undergoing TELL experiences. The findings are presented and analyzed noting links to the theoretical perspectives outlined above and other research findings.

Beliefs Towards the Role of Technology

As regards student experiences with the use of technology, all the students reported very positively in the FG interview, as Oscar[1] noted, "I want to say during this course technology is used and also improved all the English skills and I think the technology is very useful for our study and improvement." They all agreed that the use of Google Drive and Google Docs made their academic life convenient and they would continue to use these newly developed skills in their academic university courses. They also talked about technology as an assistant to their teacher in completing the curriculum effectively and in a timely manner. They all agreed that the use of technology made their workload manageable. One student Kacey commented,

We can't finish any of our homework without technology, coz everyday we write an essay and do our homework and when we submitted it on Turnitin or may be just Google Drive. [Pierre] will help us check out it and give us grades. So I think do homework and also the study is deeply connected with technology.

In their SR interview 3, one student Amy said, "I think the role of using technology, it's abstract [attract] your attentions on something. It's like to pay attention to something and to feel more interested at that and make the life easier." It was further claimed that technology use can help review class materials after class (Amy, Catherine), and make the learning process fun and enjoyable (Walter, Naomi). Catherine, Eric and John believed that a good combination of both teacher and technology is needed for students to become successful in learning language: "Yeah, because I think teacher and technology, it can combat [combine] together to improve student study. I think it is a efficient way" (John). They believed in the success of BL as it saves time by helping students understand faster, review easily and "many young people who really like to use technology to help them study" (Catherine, SR interview 1). Their previous experience of learning English in China through reading books is reported as being boring as opposed to learning through illustrations using videos and pictures in Canada. In talking about the role of technology in studying English, Walter said, "Oh, yeah. Because sometimes if teacher just simply explains something, sometimes I will not understand, but if they use the technology, for example, they show a video, that make a lot of sense for me."

Overall, from Survey 1 to 2, students' awareness around the use of educational technology in EAP seemed to have heightened with increased technology use compared to very little to no use in China. This heightened awareness of the benefits and positive role of technology in language development evolved into belief-related TELL outcomes that encouraged autonomous learning.

Beliefs Towards Teaching Methods and Classroom Activities

In the case of methods used in their EAP course, students believed that for the first time they were practicing a lot of speaking and listening, and also doing so in authentic situations in and outside of the classroom. They were doing presentations, debates where they were being challenged to think, negotiate meaning and information in collaboration with their peers. They were using the Google Slide, Google Doc, Google Chrome, Google Drive in all these activities. They were writing essays, research papers not only in a different style from what they were conditioned to, but also where they were asked to conduct research on their own or in pairs or groups. A lot of drills and work in isolation that students were used to doing was replaced with group work or pair work, not only because of the goals set in the curriculum but also because of the nature of the apps/tools that were being used in the course.

In contrast, the Chinese teacher-fronted classroom encouraged the grammar-translation method mostly and prepared students primarily to pass exams and get better marks by learning English through textbooks (Oscar, Amy, John, Eric), reading, writing (Naomi), memorizing words (Oscar, Naomi, Eric), learning grammar (Oscar, Naomi, Eric), and doing homework everyday (Catherine, John). There was little to no option for critical thinking or creative communication. Even English was mostly taught through Chinese explanations and translating back and forth. Students had very little to no practice of listening or speaking skills in China. Complete obedience is one of the classroom rules in China, therefore, "students are confined to learning what teachers are interested in teaching or what appears on the test" (Zhang, 2011, p. 44).

Use of the G Suite Tools

In the course, Pierre used the Google platform extensively. The use of the tools provided by this platform and the activities undertaken (see Table 1) helped develop a certain EAP skill set that subsequently impacted learners' beliefs towards TELL. The benefits that students reported for each tool are described in Table 2.

Table 2. Benefits of tools use as reported by students

G Suite Tools	Benefits reported by students
• Google Drive	• Improved reading, writing & listening peer and teacher immediate feedback and synchronous editing accessing others' work to alleviate confusion listening to posted videos multiple times accessing all materials from home at one's convenience
• Google Doc and Slide	• Improved writing and presentation skills synchronous access and editing of writing cloud based access adds to convenience and saving of time synchronous feedback and Q/A posted (using cell phones) during presentation
• Google+ Community	• Improved speaking skills posting videos of activities done outside of class providing peer feedback/comments
• Google+ Hangout	• Improved overall communication skills real-time co-construction of text messages during group or pair assignments up to date information of class, activity/task/ test schedule
• Google Map	• Engagement with meaningful and authentic target language authentic unrehearsed language practice enhance the spectrum of language use and experience

These reported benefits and realizations evolved into belief-related TELL outcomes that developed 21st skills and encouraged learner autonomy in learning English.

Belief-Related TELL Outcomes

The belief-related TELL outcomes are the tools students reported as finding and using of their own accord. As mentioned earlier, these were influenced by students' technology use within the course and subsequent positive attitude towards tech use. These outcomes also surfaced in phase II of the study when students were closely probed in the individual SR interviews upon posting their DD writings. In the individual tech orientation section below students are seen to be "acting autonomously," "defending and asserting [their] rights, interests, limits and needs" (Dede, 2010, p. 56) in their DD posts and SR interviews and "evaluat[ing] and select[ing] . . . digital tools based on the appropriateness to specific tasks" (Dede, 2010, p. 58).

Individual Technological Orientation (Using Other Apps and Tools)

In phase II of the study it emerged that in addition to Google, some of the students were also proactively using apps or tools like, Kindle, Grammarly, One Checker, Youdao and even Baidu to improve their reading and writing skills. These are tools students used of their own accord and their use led to more confidence and a change in beliefs towards educational technology. This is also where learners are seen creating situations of learning for themselves connected to autonomy related gains (Benson, 2010).

Kindle and Audio books

From discussion in their SR interview three and two, it was revealed that Kindle was very important in practicing reading (Naomi and Eric) outside of class. Eric commented on its portability, convenience and financial gains among other benefits. Naomi stated, ". . . when I tap it, it can show the meaning and I also can highlight some important word." This tool was used by the learners for practicing additional reading outside of the classroom. A few of the students also used audio books and mentioned that they were very useful in improving listening skills and developing vocabulary. The features of portability, and the option of repeated listening at one's own pace helped Naomi "really [improve], I mean, really" (SR interview 2).

Grammarly, One Checker and Youdao

Among grammar checking apps, Naomi advocated the use of One Checker that she found by herself in the Apple store. She believes that it helped reduce her grammatical mistakes significantly. As she commented, "it's really helped me because when I finish my essay, I just need to use the app to check my grammar. And yeah, it's really good application, and they even can suggest some better, stronger vocabularies. If you think it's good, you can just change it." (SR interview 2). Oscar on the other hand used "Grammarly" an app similar to One Checker to help him identify mistakes in a paper he had written (SR interview 2). Zara also reported the convenience of using the same app for correcting her grammar before submitting her essay. Oscar mentioned using Youdao on his cell phone specifically for checking grammar. Amy who used it both on her cell phone and laptop, mentioned how useful Youdao was for translating from "English to Chinese or Chinese to English . . . it also can translate sentence" (SR interview 1).

Baidu

"Baidu" is an internet search engine that can be regarded as a Chinese-equivalent of Google. Many of the participants mentioned using this in China, but not for educational purposes. However, some of the students studying at international schools in China reported having used Baidu for IELTS practice, working on English reading, writing, speaking and listening. Eric reported still using it at times, "Maybe sometimes I cannot understanding the English article, so I can find some Chinese article on Baidu and I translate it in English to use them in my essay" (SR interview 2).

Impact of Enhanced Beliefs

Having gone through the experience of the effectiveness, convenience and satisfaction of using technological tools, students developed an enhanced belief in the role of technology use in learning English. This enhanced belief influenced these "postmethod learners" (Kumaravadivelu, 2001) to develop academic autonomy on the one hand and the emergence of some of the 21st century skills through the activities (see Table 1) using tech-tools in the course on the other. Students are thus seen to have become conscious of their language learning strategies and styles through exploiting some of the opportunities (Kumaravadivelu, 2001) afforded by dint of participating in the research. They were able to reflect upon their language skills and strategies used through writing DDs and participating in SR interviews. They are found capitalizing on some of these learning opportunities with a view to:

- identifying their language learning strategies and styles through recording their language learning histories (for example, when in their DD posts they recorded and compared their English learning in China to that in Canada)
- evaluating some of their ongoing learning outcomes and successes with certain technological tools/apps (recorded week by week in their DD posts and subsequent discussions in the SR interviews)
- reaching out for opportunities for additional language reception or production beyond what they could receive in the classroom (for example, the apps/tools they found and were using on their own; seeking out opportunities to practice English outside of the classroom).

Hence there seems to be a move among these students towards achieving academic autonomy (Kumaravadivelu, 2001). From being used to accepting the teacher's opinion without challenge (Zhang, 2011), and being acclimatized to a teacher-dependent English learning environment, these EAP students learned to think critically, challenge peers and voice their ideas through a myriad of TELL activities in and outside of the class. Thereby emerged a work ethic among the students that embraced some of the 21st century skills of a language learner.

Work Ethics Emerging from the Use of Technology

Upon use of technology, students' mention the development of certain work ethics that they had not experienced earlier. These are connected to 21st century skills as described previously by Dede (2010).

Working Collaboratively

When I used google sides and google doc, my partners can edit while I edit, which is great. I can get the feedback from teacher very quickly, because he can see that I am typing. (Naomi)

The use of technology in EAP learning made students' lives more convenient as they could work collaboratively, edit each other's work, and check out other classmates work for clarification. Kessler et al., (2012) also found that collaborative spaces like Google Docs helped increase student participation and focused students' attention on the accuracy of their texts and their revision of practices; students perceived the collaborative process as a positive and productive experience. Similar results can be reported from synthesizing participant comments from this research data. According to Zara, "Google slides can help my group [members] share our works with each other." They were able to do all this from anywhere as Amy says: "When I have the homework that must finish with my partner, google doc and google slides will allow us to do that together and no matter we are in the different place." The use of these tools promoted the development of 21st century skills, such as, "collaborating with peers," building on negotiated feedback, and "mediated interactions with peers." All "these digital literacies not only represent skills that students should master for effective 21st century work and citizenship, but also describe the learning strengths and preferences people who use technology now bring to educational settings" (Dede, 2010, p. 61).

Specific to the use of G suite tools and benefits reported by students of this study (see Table 2) and other studies discussed above show teacher-student, student-student mediation, negotiation during learning, problem solving within a social, scaffolded environment taking place on these digital platforms. All these are aspects of the social constructivist approach where the students were scaffolded into co-constructing EAP skills through the use of TELL approaches. Shintani and Aubrey (2016) found that the interactive nature of the synchronous corrective feedback (SCF) mode of Google Docs provided "optimal scaffolding for learners" and resulted in a gradual reduction of scaffolding followed by independent attempts made by students towards their learning.

More Practice

Students believed that the activities, driven by the use of tech-tools (see Table 1) enforced more practice in language learning. Activities, such as, the conversation partner, TED talk videos, going shopping, eating out, ordering food, and use of the Google platform provided them with ample opportunities for practicing their speaking, listening, reading and writing skills both in and outside of the classroom. Amy stated that the above platform "help us to improve our reading skills by practice more and more, and do more practice, and read more." Oscar also mentioned that the use of apps made him practice more and was "good for review[ing]" and this also helped to improve his language skills. Such contexts created by the use of these tools that optimize learners' experiences of a "hyper-collaborative participatory culture" supports students' development of authority over their learning process (Kessler, 2013). This sense of authority leads to the knowledge of "how to keep learning – and make effective and innovative use of what they know," that is part of the 21st century content (Dede, 2010, p. 55). Furthermore, the tech tools provided students with more opportunities to practice at their own pace as well as made them want to do so willingly because of the fun component (reflected in students' comments and Likert scale choices made in the surveys, DD posts and SR interviews). Kessler (2018) in his discussion of technology and its future in language teaching cites Reinders and Hubbard's (2012) belief that opportunities created through technology use for students to collaboratively co-construct knowledge and collectively build communities, support them in developing autonomy over their own learning while increasing their motivation and engagement.

Engagement

The use of technology motivated the students to want to learn more, be more interested in the topic and thus facilitated learning through being more engaged. In discussing the use of tools like Google Docs in teaching academic writing, Kessler, et al. (2012) notes how being able to collaboratively access and edit the same document at the same time can lead to "more engagement in the writing process" (p.105). As Amy stated that when a person is having fun as opposed to being forced to do something ". . . you really like those kind of things, and you can pay more attention and pay more time on it, and it really can help you a lot." Studies have shown that CMC tasks and use of technological tools in language learning can promote motivation, engagement and collaborative work among students throughout a course (Lee, 2016; Prihatin, 2012).

Benson's (2011) Framework of Learner Autonomy (The EAP Course)

Benson's learner autonomy framework provides a research lens that assisted in understanding learner interaction with tech-tools and subsequent language learning behavior in a BL environment. Students' activities and teacher's practices reported in this research were mapped onto the six approaches (see Figure 1) and was observed and analyzed with the aim of understanding whether, and to what degree, technology use assisted in fostering learner autonomy within this project.

Resource-Based Approaches

Benson's resource-based learning model serves as a cover term for approaches such as self-access, distance learning, self-instruction, and out-of-class learning, that share a focus on the learners' independent interaction with physical, human, and digital language learning resources. These approaches offer opportunities for learners to self-direct their learning and develop the skills and dispositions associated with autonomy through experimentation and discovery (Benson, 2011). Within the course, students were given tasks such as, homework assignments, research essays, presentations where they had to access the Google drive to watch an online video, access a link shared by their teacher, work independently, or even in groups (see Table 1 for an overview of activities). Students specifically commented positively on the off-campus access to tasks and folder sharing that saved a lot of their time and energy. The videos they had posted on Google+ Community were very practical and based on activities off campus or outside of class. These activities not only generated authentic interaction and unexpected, unplanned conversation, but also gave students opportunities to be creative with the activity and with the use of the target language. This encouraged "independent interaction with learning materials" (Benson, 2011, p. 125) fostering learner autonomy.

The nature of tasks set by their teacher also enabled peer and teacher feedback and students were in constant contact with the whole class through Google+ Hangout. Students had access to their peer's folders through the Google drive for clarification or even self-correction. Students like Eric and Catherine have explicitly mentioned that they benefitted from reviewing peers' works and teacher's assignment feedback on Google Drive (see Table 2 for student reported benefits). Aubrey (2014) also reported students benefitting by getting new ideas from watching their peers write as well as learning from each other's mistakes.

Enabled by the use of a community-based learning system through the Google Drive, the tasks were designed to foster collaboration and a sense of presence and involvement of members in the language learning process. Having gone through the experiences of working on tasks with tech-tools collaboratively and independently, students learned to take charge of their language learning and evaluate their learning processes, styles and strategies as communicated in their SR interviews. This reflects the onset of learner awareness and movement towards learner autonomy. Benson (2011) concedes that technological developments expand the domain of resource-based learning by creating new possibilities in which different modes of learning complement each other. This specific viewpoint strengthens resource-based learning by providing conditions such as collaborative work, support, and a range of skills that different modes of resource-based learning can accommodate under which learners can develop control over their learning.

Technology-Based Approaches and Learner-Based Approaches

Benson (2011) believes that as "new learning technologies are constantly in search of new homes," separating technology-based learning from resource-based approaches facilitates understanding of how the "new technologies, themselves, as opposed to approaches into which they are integrated, may be supportive of autonomy" (p. 145). In the course, initially many students were using different tools introduced by their teacher, but having realized the benefits (see Table 2), some of the students started to use tools referred by peers/friends, or having searched the net and found on their own. This suggests a meta-awareness of strategies and tools that aided language learning as reflected in the SR and FG interviews. For example, Eric talks about his English speaking skills improving: "I'm very happy to finish this course because, we use a lot of technology tools to help us to study English and improve our English level and I think, it meet my expectation because, my English skills improve a lot." The students mentioned that they would continue to use the Google platform in their future university studies as it helped them to concentrate, make their lessons more interesting, and easier to understand (Naomi, Oscar, John, Eric, Catherine, Amy, Joanne), improve overall English language skills (Jacey, Tiffany), enrich their learning experience (Wesley) and help them adapt better in courses in the next semester (Jake). Overall, Kacey believes that their language development is "deeply connected with technology" use. According to Johnston and Lawrence (2018) technologies like Google Docs and wikis enable a multi-faceted interaction among EAP learners leading towards developing a high degree of interdependence, and autonomy. Kuteeva (2011) found that within wiki, interaction and peer collaboration led to building writer autonomy and voice. Research has shown that certain "CALL based applications," such as "word processors" encourage "creative manipulation of text" can "intrinsically [be] supportive of cognitive and metacognitive autonomy" (Kenning, 1996, p. 128).

Learner-based approaches directly attend to learner development or behavioral and psychological change within the learner (Benson, 2011). This involves increasing awareness of oneself as a learner and an increasing willingness and ability to manage one's own learning (Benson, 2011). Such awareness within the EAP learners is evident in the individual technological orientation that encouraged them to try out apps/tools on their own to enhance their learning experience. Participating in phase II of the study and the posting of weekly DDs compelled the students to revisit, reminisce and review their behavior, strategies and tool use. This kind of self-assessment or rather monitoring of one's own progress, performance and recording of them in DD posts, reviewing them afterwards in SR interviews falls within the purview of autonomy gains (Benson, 2011). In case of reviewing their behavior, students mention an array of activities that demonstrate the realization of the importance and benefits of TELL approaches in learning English, such as, students reported using subtitles while watching a video clip (Zara), using a monolingual (English to English) dictionary and talking more with native speakers instead of Chinese speakers of English (Eric). Participating in this study also led the students to use strategies that seem more helpful in learning language (Walter), find the most suitable tool in learning English (Oscar), work harder in and outside of class, and try to make the most of the resources and available tools (Naomi). John also realized the importance and convenience of using technological tools in studying English and Amy pointed out that "when I do the interview or the post, when I think about that, I think yes, it's really helpful for me in those kind of ways . . . I think there must have more technology tools that can really help me to organize my life, or help me to either to finish my work, and it let me more focus on those kind of technology tools" [Phase II: DD posts and SR interviews]. The comments and activities discussed above highlight a move among the students towards an increased critical awareness and a propensity to adopt tech tools and autonomous language learning behavior in developing and enhancing their EAP study.

Teacher-Based Approaches

In teacher-based approaches to fostering autonomy the emphasis is placed on the teachers' role, teachers' approaches to teaching and learning. Teacher education is also viewed from a focus on the teacher as a conduit for methods devised by experts to a focus on the teacher as a self-directed learner and practitioner (Benson, 2011). The course teacher, Pierre, is described by his students as "a guide" (Ethan), who "told how to use technology and how to make the study and technology together to study better" (John), "a mentor" (Wesley), and "the main ingredient to help improve English" (Oscar). In talking about the teachers' role in a tech-enhanced environment, all students valued the role and importance of Pierre in introducing them to the apps/tools and encouraging their use throughout the course. As John says, "if [Pierre] not teach us to use the Google, teach us to use the Google Drive, Google Doc, and we never know how Google meaning." They enjoyed the authority of assessing each other (or groups, depending on the task) in debates and presentations using rubrics provided by Pierre, having a say in marking and the knowledge of the components that are considered in evaluating their own development. All in all, Pierre seemed to fit the profile of this framework by being a facilitator, helper, coordinator, counselor, consultant, advisor, knower, and resource (Benson, 2011).

In the case of teacher education, as discussed earlier, Pierre was very much informed and driven by tech-mediated practices founded in theory through his MA degree and published research work. His discontent with conventional practices at various stages and levels of language teaching over the years motivated him to search for answers by pursuing graduate studies and developing technological skills. Thus, Pierre's extensive degree of autonomy is reflected in his TELL teaching approaches, methods and tools used that were not required by the institution. Benson (2011) believes that this autonomous drive on the part of the teacher helps foster learner autonomy among students.

Classroom-Based and Curriculum-Based Approaches

Classroom-based and curriculum-based approaches assume the learner to be involved in planning and evaluating classroom learning, the key factor in development of autonomy being the opportunity for students to make decisions about their learning within collaborative and supportive environments (Benson, 2011). In case of learner control over the planning and assessment of classroom learning, students were involved in peer assessment (as mentioned earlier) in specific areas, like debates, presentations, peer editing of essays, and assignments in a controlled/limited way. In other words, students only assessed in instances that the teacher asked them to, using a specific rubric, so not of their own accord. However, given the target language level of this particular group it would seem inappropriate for them to be involved in planning teaching materials or even curriculum for that matter and none of these activities were observed among the students.

Thus, from the above discussion we can conclude that there is evidence of events, situations, and conditions that reflect autonomy development in Benson's (2011) resource-based, technology-based, learner-based and teacher-based approaches. It must be mentioned that given the students' past experience that involved little to no use of educational technology, it is compelling to find the level of learner autonomy that was gleaned from the data within this study.

IMPLICATIONS

Based on the findings and participant voices from this research, some implications and recommendations in incorporating TELL teaching towards the development of 21st century skills and learner autonomy into language classrooms and practices will be outlined. As the language educator is the impetus to a successful tech integration in TELL teaching therefore, the following implications are all centered on raising the teacher's awareness towards certain aspects that emerged from this study.

Educating Teachers in TELL Pedagogy

It appears that the key to success lies in language integration being driven by pedagogy-informed technology use. The teacher participant's educational background, his teaching experience and interests, his keenness in e-learning and tech-tools and constant dissatisfaction with the system motivated him into exploring new avenues in search of a satisfactory system and answer. Pierre's theory-informed pedagogical approaches and strategies leveraged the affordances and also cautioned him of the constraints in adapting and modifying educational technologies used within the course. Kessler et al. (2012) reiterate the importance of pedagogical reflection because it promotes guidance towards more extensive preparation of tech-driven teaching approaches that foster 21st century autonomous language learners. Furthermore, a community of practice can be deemed necessary to enable teachers to share their successes and failures within the EAP community. Teachers' "personal and professional online networks can facilitate the sharing of technology skills, lesson plans and collaboration across disciplines, which enable more effective use of technology in the EAP classroom" (Yim & Warschauer, 2016, p. 604).

Teacher Intervention in Educating Students: What, Why, How

One of the other important implications that emerged from the findings is the need for educating students about the specific technologies that are being used by the teacher, why they are being employed and, of course, how to maximize their use in learning language. The researcher intervention during phase II of this study prompted students to reevaluate and critically reflect upon their language learning strategies and behavior. This critical reflection revealed not only the gaps or confusion among students as to why certain tool use was being enforced by their teacher, but it also helped to mitigate some of the stress and anxiety among students who were unable to move towards successful tech integration. Phase II of the study can be replicated by the teacher in any language course. Levy (2015) calls for "planning a classroom intervention" in highlighting "complexities involved in closing in on the learner's experience" (p. 566). Kessler (2018) calls for language teachers to refocus on the education of the learner as the point of leverage "by attending to students' learning styles or helping learners to develop awareness of how they best learn" (p. 209). This kind of an intervention is much needed for learners to exercise control in "learning behavior," "psychology of learning" and "learning situations" (Benson, 2011, pp. 60- 61).

Leveraging Students' Digital Resources

Another important implication of this study is how success in tech integration can be achieved by leveraging student-used tools. As reflected in the belief related outcomes of the study, having experienced the TELL benefits (see Table 2) some of the students are found searching and using tools/apps on the web. They were introducing tools such as, Youdao, Baidu, Grammarly, and One Checker to their classmates. Integration of these tech-tools has proven to be beneficial and relevant to their course, leading to further language development. EAP teachers and researchers are advised to consider "students' naturally-occurring technological practices" and incorporate them into their curriculum and instruction (Yim & Warschauer, 2016). This will help teachers better understand how technology relates to both the personal and academic lives of L2 learners.

Ongoing Critical and Reflective Practices

Ongoing critical and reflective practices can be beneficial for any teacher integrating TELL practices as they continue to upgrade the tools used as well as strategies and methods employed. Participating in research studies when presented with the opportunity, or having weekly meetings with individual students can be very informative. Conducting action research and recording outcomes, video recording and going through the recorded clips to identify difficulties or successful moments with a new tool can be of great value in providing accurate information on tool integration. It can also help teachers observe students' developed skills and aspects of Benson's learner autonomy framework (see Figure 1) and evaluate, review and align practices accordingly. For teachers to continue to evolve along with the emerging tech-tools, understanding how "to meet . . . students in [the] new participatory environments" (Kessler, 2013, p. 314) requires ongoing critical reflections on one's teaching practices.

CONCLUSION

In order to understand and be a member of the new landscape of world language teaching and learning dominated by technology, both teachers and students must be literate in ICT (Dede, 2010). Fluency in ICT does not transfer to tech literacy only, rather it is essentially the 21st century content knowledge and life skills that enables the "use of technology to learn content and skills" (Dede, 2010, p. 55). These are essential life skills that teachers are expected to incorporate into their pedagogy and, according to Dede (2010), good teachers have always done so. Coupled with the knowledge of ICT, language teachers have to integrate tools that motivate and engage learners in their language learning process towards a more autonomous learning environment at the same time. At the TESOL 2018 International Convention & English Language Expo in Chicago, Illinois, Dr. Zoltán Dörnyei gave a keynote lecture entitled *Engaging ELLs (English Language Learners) in the 21st Century* where he talks about finding ways of generating student motivation and engagement against unprecedented variety of distractions in today's globalised, digital age. He defines student engagement as being "actively involved in the learning process," more explicitly in education, as being "involve[d] in school related activities and academic tasks." He calls for the need to match the syllabus to students' needs, to personalize teaching materials, involve learners in building their own syllabus, a criteria of Benson's learner autonomy framework, and last but not least, designing learning tasks that harness the power of technology. This endorses the need for research that focuses on students' perspectives as well as the need to deliver an engaging, contemporary education system that students are very much citizens of.

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KEY TERMS AND DEFINITIONS

BL: Blended learning is used in this study as a kind of learning and teaching environment that supplements and compliments teacher's face-to-face instructions with technology-based materials and resources.

CLB: The Canadian language benchmark is a descriptive scale of language ability. It is used as a national standard in Canada for describing, measuring and recognizing the English language proficiency of adult immigrants and prospective immigrants for living and working in Canada.

EAP: English for academic purposes is a specific type of English language course referred to here as specifically a course for international post-secondary students looking to enter North American, British or Australian universities. These courses are often extremely intensive and target teaching language skills necessary for university or academic setting.

G Suite: G Suite comprises of Gmail, Hangouts, Calendar, and Google+ for communication; Drive for storage; Docs, Sheets, Slides, Forms, and Sites for collaborative and individual work- all on the Google platform. This term is generally used to refer to the above.

ICT: Information and communication technology is a term that has been coined by Dede (2010) to refer to 21st century content knowledge and life skills that use technology to develop skills, such as critical thinking, problem solving, information use, communication, innovation and collaboration. Teachers are nowadays expected to include knowledge of ICT to make their pedagogy motivating and engaging to learners.

IELTS: The English language testing system is the world's most popular English language proficiency test for higher education and global migration. IELTS assesses all of the four skills (reading, writing, listening and speaking), and is designed to reflect how one will use English at study, at work, at play, and in one's new life abroad.

Learner Autonomy: Learner autonomy is a capacity for the learner to be able to critically reflect on their language learning behavior and strategies used. Based on this critical reflection, learners are able to take decisions and act independently, adapting in ways that may help them learn better and transfer what has been learned to wider contexts. This greater learner control over the learning process, resources and language is achieved through collective decision-making rather than individual choice.

TELL: Technology enhanced language learning refers to lessons, teaching materials and resources that utilize technology to make learning engaging, motivating and palatable to a wide range of learners of different age groups, backgrounds, ethnicities, and cultures.

ENDNOTES

[1] Pseudonyms are used for all students and teacher participants in this study.

Chapter 7

Foreign Language Learning Through Instagram:

A Flipped Learning Approach

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ABSTRACT

This chapter explores the use of a flipped learning approach through the application Instagram in an English as Foreign Language (EFL) class. A case study involving 53 participants at a high school is presented. A mixed methods approach using quantitative and qualitative information is carried out where 4 different data collection instruments collected information about students' perceptions of the flipped learning model as well as the use of Instagram. Findings emphasized the app and the flipped learning methodology as motivational and useful elements to develop language learning processes. However, learner feedback indicated that the flipped learning model used in this research was not viewed as superior to traditional lecture-based instruction. This chapter concludes with a discussion of the implications of implementing flipped learning models that utilize mobile devices in EFL education.

INTRODUCTION

The use of social networking platforms in classroom environments with the aim of developing different learning purposes has been a common practice since their appearance (Mao, 2014). From the use of wikis and blogs (Seaman & Tinti-Kane, 2013) to the use of the latest social networking platforms such as Facebook, Twitter, WhatsApp or Instagram (e.g., Andujar & Salaberri-Ramiro, 2019; Çakmak, 2019), researchers have attempted to exploit the possibilities of these platforms to facilitate language learning

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processes. Among these possibilities, the different modes of communication within these virtual platforms (Mazer, Murphy, & Simonds, 2007) have allowed various types of interaction, whether written, spoken or through video and image-sharing. Likewise, these contexts have been found to be particularly promising for the development of blended learning models through which language educators can extend in-class time and provide a higher amount of input to their second or foreign language learners.

Apart from the different possibilities offered by social networking platforms for language development, at a university level it also seems necessary to leverage the latest educational resources in order to transform learning environments into contexts where in-class tuition and online learning processes coexist. In this sense, the combination of in-class tuition with online environments has given rise to blended learning models (Arbaugh, 2014) which are more flexible and autonomous contexts for language development than many conventional language classrooms. These new online environments have normally been investigated in the computer-assisted language learning (CALL) and mobile-assisted language learning (MALL) literature in which the impact of blended learning models for language development has been analysed (e.g., Chen Hsieh, Wu, & Marek, 2017; Hung, 2015). Among the different findings in blended learning studies investigating language development, it is worth mentioning factors such as higher participation and motivation levels, an increase in students' autonomy and a facilitation of the language learning process (Ball & Lindsay, 2012; Law, Geng, & Li, 2019; Miyazoe & Anderson, 2010).

In this context, social networking platforms such as Instagram, Facebook or WhatsApp allow teachers to facilitate language learning processes while students are involved in social interaction. For this research study, the application Instagram was selected due to the following factors: the widespread popularity of the application which reached 1 billion monthly active users and 600 million daily active users (Stout, 2019) as of September 2019; the possibilities of sharing and viewing video content through the social network that enables researchers to implement a flipped learning methodology; theoretical consideration such as the fact that students do not normally use technology they consider intrusive (Kukulska-Hulme & Shield, 2007); and the ubiquitous characteristics of mobile devices. Given this context, this study examines the growing literature on social networks and language learning and investigates the use of a blended learning model involving Instagram.

SOCIAL NETWORKS AND LANGUAGE LEARNING

Online social networking platforms, which are normally used for socializing, sharing information such as videos or pictures, or meetings (Boyd, 2014), are visited mostly by young people (Counts & Fisher, 2010; Dunn, 2013). Moreover, although the majority of these platforms provide web and mobile versions, social media usage is shifting towards mobile devices (Statista, 2019), which may lead to an increase in users' engagement levels as a consequence of a higher degree of accessibility. Thus, educators attempting to enhance learning through the use of social networks need to consider factors such as the type of learners and their accessibility to online contexts in order to develop successful learning environments. In this context, recent studies in the field, such as for example Andujar and Salaberri-Ramiro (2019), have demonstrated differences between the use of social networking tools in language learning from mobile and stationary devices.

With regard to the use of social networks, since their appearance, a great number of social networking tools have been used for different learning purposes (Mao, 2014). In the language learning field, it is worth mentioning the possibilities that this type of platform offers for interaction and communication through different channels (Mazer et al., 2007), which allow students to communicate by either texting, speaking, or simply through videos and pictures. Although the greater number of communication modes provides different possibilities from the second language learning perspective, not every social networking tool can be exploited in the same way. In this sense, social networks such as Twitter or Pinterest are bound to certain types of communication – written and visual respectively – whether others like WhatsApp or Instagram also allow voice recording and video sharing. These online environments have been found to be fertile ground to foster language interaction, group work and students' linguistic competence (Blattner & Fiori, 2011; Farr & Murray, 2016). Similarly, previous research making use of social networks to foster language development (e.g., Andujar & Salaberri-Ramiro, 2019; Andújar-Vaca & Cruz-Martínez, 2017; Lomicka & Lord, 2016) has emphasized the importance of social interaction for language learning. The interaction between native and non-native speakers or between non-native speakers has been found to foster an environment where language-related episodes (LREs) can occur (Swain & Lapkin, 1998). These LREs may be conducive to language learning as students reflect on the different language usage in the social network as well as on the language used by their peers. Furthermore, other factors such as students' observation and collaborative work appear to be increased during social interaction in these virtual platforms (Ryberg & Christiansen, 2008).

However, negative factors resulting from the use of social networks have also been identified in the literature. These include an increase in teachers' workload (Shih, 2011) owing to the fact that it is necessary to control the language and contents used in the platform, the type of language register that normally contains abbreviations, misspellings as well as great number of medium specific adaptations (Kabilan, Ahmad, & Abidin, 2010), privacy issues due to the necessary information exchange between peers and between students and teachers (Gettman & Cortijo, 2015; Teclehaimanot & Hickman, 2011) and the distracting nature of the medium often associated with informal learning (Rambe, 2012). Thus, it seems necessary to overcome these negative aspects as well as shed light on the different possibilities of certain social networks for language development in order to design successful learning environments.

Flipped Learning in EFL

The volume of research implementing blended learning environments in different educational contexts has grown rapidly in recent years (Yang, Sun, & Liu, 2017). In the field of blended learning, the growing popularity of flipped learning is noteworthy (Bergmann & Sams, 2012). This methodology, which involves the use of video lectures before the start of the class, practice problems as homework, and group-based activities during the in-class time (Bishop & Verleger, 2013), has been investigated in the EFL field as shown by the numerous articles published in high-ranked international journals (Yang, 2017; Chen Hsieh et al., 2017). The literature on flipped learning in the EFL field reported positive effects of this type of methodology on the development of various language skills.

In this context, studies have investigated the potential of the above methodology to develop EFL competences. Chen Hsieh et al. (2017) made use of the application Line to foster English idioms in a flipped learning context. An experimental design ($N = 48$) with a control group in which students received traditional lecture-based classes and an experimental group in which the above application was used, showed significant differences between students' idiomatic knowledge in favour of the latter. A questionnaire exploring learning experiences also yielded positive results. Moreover, the flipped model was found to be successful in achieving the instructional goals of the course. Apart from idiomatic expressions, other flipped learning studies in EFL such as Wu, Chen Hsieh and Yang's research (2017) investigated the potential of the flipped learning model to foster students' oral proficiency in the L2. Pre and post-tests on oral reading comprehension and structured interviews were used to assess 50 Taiwanese students of EFL. Results showed a significant improvement in students' oral proficiency and it was found that the flipped learning methodology motivated the participants and enhanced engagement. In the same vein, speaking skills were also investigated by Amiryousefi (2019) who used the mobile instant messaging application Telegram to implement a flipped learning model with 67 learners of EFL. Three different groups were created and different types of teaching were followed in each group: traditional lecture-based instruction, semi-flipped learning and flipped learning. An experimental design involving pre- and post-tests were administered to explore significant differences between the groups under investigation. In line with previous studies exploring flipped learning in EFL, results emphasized significant differences in the speaking skills of those who experienced the flipped learning model. Apart from the aforementioned studies, researchers have also made use of other platforms to develop flipped learning models in EFL such as Blackboard (e.g., Kang, 2015; Alsowat, 2016) or Moodle (e.g., Jeong, 2017; Webb, Doman, & Pusey, 2014) among others. However, either in an educational or EFL context, there is an absence of research exploring the potential of the application Instagram as a blended learning environment.

Instagram

Although the amount of research investigating the potential of Instagram in the language learning field is limited, there are a growing number of studies investigating the use of the application in other contexts. Likewise, there are also studies describing the different possibilities of the application to foster language development (e.g., Handayani, 2016). The remarkable popularity of this application among young people has elicited an increase in the amount of research exploring its potential. However, with regard to language learning purposes, only a small number of studies have been identified in the literature. One of these is Al-Ali's (2014) investigation into the use of the Instagram to develop different classroom activities. Forty female students had to first find a picture in the app, write a story about that picture and later upload a short video related to the photograph. A questionnaire measuring the overall experience in the platform yielded positive results and students were satisfied with the use of the app. However, some negative aspects were also reported regarded issues such as privacy or students' reluctance to upload their homework into the platform. Further recent research such as Akhiar, Mydin & Kasuma's (2017) study, investigated the potential of this app to develop students' writing abilities. In this research, participants (*N* =101) had to comment on pictures taken by themselves in the app. Students were later asked about the learning experience and perception of the use of Instagram to foster writing in the L2. Positive results were reported with regard to the perceived improvement in students' writing abilities and the overall experience. However, as in the aforementioned research, some negative aspects were also identified such as the distracting nature of the application or a certain degree of fear of feeling judged when using the L2. Writing abilities were also explored by Yadegarfar and Simin (2016) who investigated the effects of Instagram on learning grammatical accuracy of word classes. Through the use of an experimental design, students were divided into a control (*N* = 46) and experimental group (*N* = 46). Word classes were taught through the application in the experimental group and through traditional lectures in the control group. Findings indicated that the experimental group outperformed the control with regard to learning grammatical accuracy of word classes. Likewise, participants reported a positive attitude towards the use of the application.

Regarding listening comprehension skills, Liliia and Gulnara (2016) investigated the potential of this tool with advanced level students of English as a foreign language. Participants ($N = 50$) watched three different videos per week through the app where they had to put into practice their listening skills and carry out a series of tasks and exercises. A mixed methods approach was used to collect qualitative and quantitative data and pre- and post-tests were also administered to assess participants' listening skills development. Results indicated positive findings with regard to the use of the app as an online educational environment for the improvement of listening skills. The video functionalities of the application were also investigated by Mansor and Rahim (2017) who required students to upload presentations that were subsequently commented on by their peers. Participants ($N = 20$) indicated feeling more motivated towards learning and highlighted a high degree of interaction with their peers. Results with regard to students' participation were also remarkable. Finally, Çakmak (2019) made use of the application to assess students' oral communication skills. Results emphasized that the use of the application facilitated students' oral performance and that personality traits were not predictors of students' performance in the application.

As observed in the above literature review, although the amount of relevant research regarding Instagram and language learning is growing, it appears necessary to further investigate which areas of EFL could be fostered through the use of this application. Thus, this chapter attempts to extend the existing literature in the field by conducting a case study in which the application was used to develop a flipped learning model in a second language class. In order to address this aim, the present study attempts to explore the following research question:

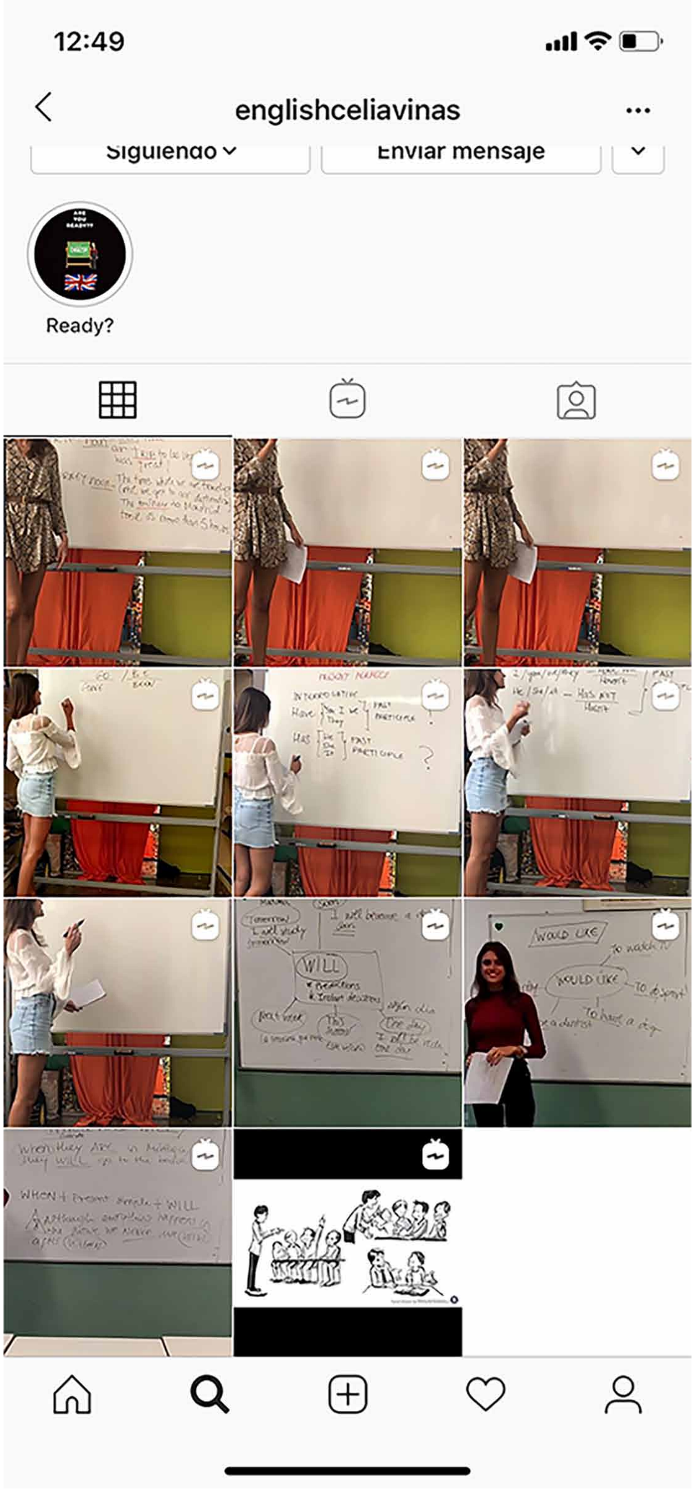
What are students' perceptions regarding the learning experience provided by Instagram in a course that utilises flipped learning?

THE STUDY

The case study in this investigation was implemented at a secondary school where students were learners of English as a foreign language. A total of 53 Spanish students – 30 female and 23 male – with ages ranging from 14 to 16 participated in the experiment in which a flipped classroom model was utilized involving the use of Instagram over a period of two months. Participants received regular classes and met for 3 hours per week. The material and contents provided in the course followed the didactic units of an English book for secondary education which met the parameters established by the *Common European Framework for Reference* (CEFR) for a B1 level. Short clips of the grammar contents that were going to be put into practice during the class were provided to students through the platform. The teacher of the group recorded the educational explanation and uploaded the videos to the wall of the account created for the class. The Instagram TV feature of the app was used for this purpose. Figure 1 presents a screenshot of the Instagram account students had to follow to view the videos.

Following the flipped classroom model (Bergman & Sams, 2012), students had to view the videos before the start of the lecture. An initial evaluation was carried out in order to evaluate the contents explained in the video and practice sessions were subsequently organized. Participants had to follow the teacher account in the social network and 'Instagram stories' were used to inform students that a new video was going to be released. In order to indicate that they had viewed the video, students had to press the 'like' button in the app. This allowed the teacher to track views of the video. All the students

Figure 1. Account used by the teacher to upload the video contents



owned a mobile device to access the contents in the app and knew how to use the application as they all had an Instagram account. Participants identities remained disguised during the data collection and analysis. Regarding analysis of the data, the teacher of the group was not the same as the researcher who evaluated the results of the study. In order to increase the reliability of the analysis, interrater reliability was calculated using two different raters. Agreement between the two raters was 98% indicating a strong agreement in the analysis carried out.

Methodology

This investigation followed a mixed methods methodology (Onwegbuzie & Teddlie, 2003) in which qualitative and quantitative data were analysed. In this sense, different data collection instruments were used. First, a log was used to collect the information regarding the tracking of the students in the platform such as the user name of the students in the app, the number of views per video or the amount of likes in each of the videos. In order to explore students' perceptions regarding the flipped learning model in the app, a 5-point Likert questionnaire 'Perception of flipped learning experience' (Chen Hsieh et al., 2017) regarding flipped learning in Line was adapted for this investigation (Appendix A). Four different constructs including motivation, effectiveness, engagement and overall satisfaction were evaluated. This questionnaire, which had already obtained expert validity and was based on relevant flipped learning literature, was analysed statistically after the data collection process in order to guarantee that items were appropriately and uniformly understood ($\alpha = .89$). Apart from this perception scale, in order to better understand students' perceptions about the use of the flipped learning model in the app, a semi-structured interview (Appendix B) was also conducted. Finally, the technology acceptance model (TAM) scale (Appendix C) was also administered at the end of the study.

Analysis

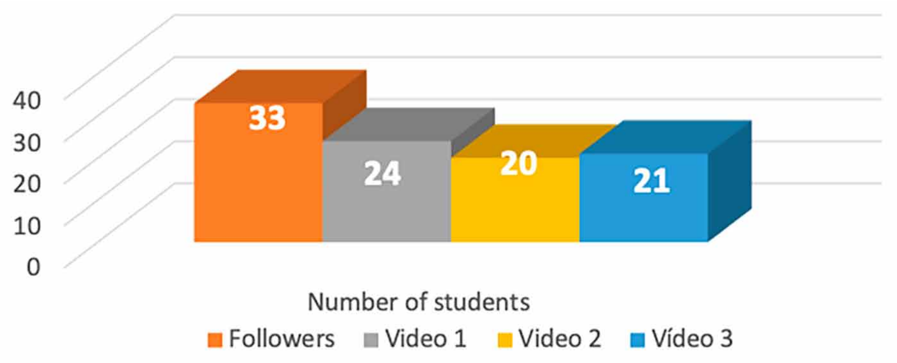
In order to analyse the information collected in the learning experience questionnaire and the TAM, the statistical software SPPS was used. Inferential statistics and an analysis of the frequencies were carried out. This branch of statistics allowed the researchers to make inferences about the sample under investigation as well as evaluate if participants tended more towards either end of the scale. The one-sample Wilcoxon rank test (Siegel & Castellan, 1956) was used for this purpose. This statistical test for ordinal variables also allowed the calculation of the effect size r for each of the constructs under investigation. Due to the fact that depending on the sample size almost everything could achieve significance, the effect size was calculated in combination with p value in order to further understand the relevance of the results obtained. In addition to this statistical test which was used for the questionnaire, descriptive measures and frequencies were also calculated for the two quantitative data collection instruments. As for the analysis of the semi-structured interview, a content analysis methodology was followed, coding relevant sections of the transcripts and identifying patterns in participants' responses. Examples of participants' responses in the focus groups for each the questions were also gathered and will be presented in the results section.

RESULTS

Quantitative Findings

The results obtained from the first data collection instrument, in this case the log used to track students' behavior in the application, are presented in Figure 2.

Figure 2. Audience of the Instagram TV videos



As can be observed in Figure 2, out of 53 students, only 33 followed the Instagram account created by the teacher for the class. In this context, it is worth mentioning that the total number of views of the videos did not live up to researcher expectations. The qualitative data obtained in the interview provides a more in-depth explanation of these findings and will be discussed at a later stage of this chapter.

Table 1. Descriptive statistics of the "Flipped learning experience" questionnaire (Chen Hsieh et al., 2017)

	N	*Mean*	*SD*
1. A flipped classroom model is a better way of learning.	48	3.44*	1.25
2. I enjoyed the Flipped classroom teaching approach more.	48	3.56*	1.23
3. I think the flipped classroom is a more effective and efficient way to learn.	48	3.33	1.27
4. I feel more motivated in a flipped classroom.	48	3.27	1.10
5. I participated and engaged myself more in learning in the flipped classroom.	48	3.04	1.01
6. I became a more active learner in the flipped classroom.	48	3.08	1.25
7. I thought the time and effort I spent in the flipped classroom was worthwhile.	48	3.54*	1.09
8. I learned more and better in the flipped classroom.	48	3.17	1.17
9. I prefer the flipped classroom to a lecture-based classroom.	48	3.56*	1.35
10. I think the flipped classroom learning guided me toward better understanding of the course topics.	48	3.13	1.08
11. I experienced pleasure in the flipped classroom.	48	3.63*	1.08
12. I devoted myself more to the instructional/class activities in the flipped classroom.	48	3.27	1.08
13. I spent more time and effort than usual on my flipped classroom learning activities.	48	2.92	1.04
14. Generally, I am happy and satisfied with this flipped learning experience.	48	3.65*	1.15

*Statistically significant difference $p < .05$

The second research instrument explored students' perceptions about the flipped learning model in the app. Table 1 presents the results of the information collected in the questionnaire.

The Wilcoxon signed-rank test was used to explore significant differences between the different items. Item 1 explored students' perception of the flipped learning experience as a better way of learning in comparison with traditional language classes. Results yielded significant differences in favour of the implementation of a flipped learning approach ($Z = 2.5$, $p < .05$), although the effect size was low ($r = .34$). Similarly, results with regard to students' degree of enjoyment (item 2) were positive ($Z = 3.03$, $p < .05$) and the effect size was moderate ($r = .43$). These findings were later confirmed in subsequent items of the perception questionnaire such as item 7 or item 9 where students indicated that they considered the flipped learning method worthwhile and expressed their preference over traditional lecture-based classrooms. Results indicated significant differences in favour of the flipped learning model ($Z = 3.04$, $p < .05$ and $Z = 2.54$, $p < .05$ respectively) with moderate ($r = .43$) and low effect sizes respectively ($r =.36$). Finally, item 14 explored the overall satisfaction with the flipped learning experience. Positive responses gave rise to significant differences ($Z = 3.50$, $p < .05$) with a moderate effect size ($r = .50$) confirming previous findings in the questionnaire. Thus, the results emphasized that although students enjoyed the flipped learning experience, there was still room for improvement.

The third research instrument developed for this investigation was the technology acceptance model which attempted to explore the overall learning perception of the use of Instagram in the course. The information collected in this scale was again analysed quantitatively through the use of inferential statistics. Descriptive measures of this scale are presented in Table 2.

Table 2. Descriptive measures of the TAM

Construct	*N*	*Min*	*Max*	*Mean*	*SD*
System characteristics	45	1	4	3.16	.85
Material characteristics	45	1	4	3.53	.69
Perceived ease of use	45	2	5	3.87	.91
Perceived usefulness	45	1	4	3.09	.90
Attitude about use	45	1	4	3.31	.84
Behavioral intention	45	1	4	3.16	.85

The TAM is divided in six different subconstructs in order to fully ascertain participants' overall perception of the use of Instagram. The first construct evaluated students' perceptions regarding the system characteristics ($M = 3.16$). Results yielded a positive perception with regard to the use of Instagram as a stimulating and realistic environment for learning English and students highlighted feeling comfortable while visualizing the videos. The second construct evaluated the materials provided to students through the app ($M = 3.53$). Students' responses regarding the comprehension, usefulness, and support provided through the materials and contents used in the videos were quite positive. Although suggestions were given in the qualitative analysis section of this chapter to improve the materials, students' degree of satisfaction was high.

The third construct investigated the perceived ease of use of the application. Participants already knew how to use the app as all of them had the social network already installed in their devices. Thus, students did not have many problems visualizing the contents or using the app ($M = 3.87$) throughout the flipped classes. With regard to the fourth construct, students found the use of the app beneficial in fostering their language abilities and their eagerness to learn was also increased ($M = 3.09$). However, these results were not noteworthy as the average of responses is close to 3 which was considered as neutral response.

The fifth construct explored whether students enjoyed using Instagram for language learning and whether they had a positive attitude towards the use of the app. Results indicated that students welcomed the platform as a language learning resource ($M = 3.31$) and found the app potentially interesting for language learning. The last construct in the TAM explored whether students would like to continue using Instagram for learning English as well as for participating in conversations in the platform. Students responded positively ($M = 3.16$), a finding that suggests further research in this area is warranted. In answer to the research question, data show that students were satisfied with the use of Instagram for learning the target language and found the environment to be comfortable and motivating.

Qualitative Findings

In order to obtain the qualitative data, interviews with 5 different focus groups which consisted of 6 participants were carried out. Nine different questions about the flipped learning experience through Instagram were asked to participants. Question 1 explored students' perspectives regarding the methodology. Most of the students highlighted the use of this methodology as a good idea and common reasons already pointed out in the flipped learning literature such as the possibility of pausing, rewinding and watching the lecture several times were emphasized. Furthermore, other reasons related to the use of the application were also pointed out by participants such as the possibility of writing comments to the videos or asking questions about in the app. Participants also highlighted feeling closer to the teacher during the flipped classes. The following are examples of these learners' comments:

If there are different levels in class, each person can watch the explanations at his/her own pace. (Focus group 1)

You can watch the videos whenever you want. (Focus group 1)

You are not distracted with your classmates while watching the videos. (Focus group 3)

If you don´t attend the classes, you can watch the lessons instead. (Focus group 4)

As you have your teacher in Instagram, the relationship is closer. (Focus group 4)

You can write comments in order to ask questions. (Focus group 5)

Among the adjectives used by students when answering this question, words like motivational, curious, interesting, comfortable, different, innovative, entertaining or useful came up. Some negative opinions were also found in the focus groups such as the distracting nature of the application, wifi connectivity, the length of the videos, the difficulty in remembering the content of the videos or the impossibility of asking questions directly to the teacher. The following comments highlight these issues:

You get distracted with other things in your mobile phone and you never end up watching the full video. (Focus group 1)

Sometimes we do not have an available wifi network. (Focus group 2)

Videos are sometimes too long. (Focus group 3)

In my opinion, I don´t like it because I have doubts and I cannot ask questions. (Focus group 4)

Sometimes, I don´t remember the explanation in the video so it's difficult for me to follow the class. (Focus group 5)

The second interview question explored whether students considered useful the implementation of the flipped learning model. Two focus groups unanimously responded positively to this question. Some exceptions were found in other focus groups were students indicated the absence of the teacher and a high number of distractions as problematic.

No, because I get distracted. (Focus group 3)

The teacher is not there so if you don´t understand the language, it's difficult. (Focus group 5)

The third question in the structured interview evaluated the accessibility of the videos in the platform. Most of the students in the focus groups highlighted the easy access to the videos. However, a small number of students also indicated some problems such as the lack of the required updates, or the amount of time required to load them. Learner feedback is presented below:

I did not have the updates so I couldn´t watch the videos. (Focus group 2)

The loading of the videos was very slow. (Focus group 4)

I was punished without my phone. (Focus group 5)

Question four of the structured interview evaluated students' perceptions regarding the content of the videos. The majority of the students in the focus groups indicated that the contents provided in the videos were clear and comprehensible. Furthermore, positive answers with regard to the inclusion of extra content, the organization of the videos or the corrections to some of the in-class tasks were given. Students' responses are presented below:

Everything is well-explained and, in addition, there are things that do not appear in the book. (Focus group 1)

I like the division of the contents in three short videos. (Focus group 2)

I pay more attention to the video than to the class. (Focus group 4)

A small number of negative opinions were also expressed regarding the content, mainly regarding the lack of understanding in some cases, the quality or the need to join and sum up the videos:

I did not understand the language so it was difficult for me to understand the contents. (Focus group 3)

The audio quality was average. (Focus group 4)

I believe that is better to summarize everything in one video because many times I don’t realize there are more videos and I don´t watch all the contents. (Focus group 5)

The fifth question of the structured interview explored whether students had experienced difficulties understanding the videos. Most of the students in the focus groups responded negatively, which suggests that the contents of the videos were appropriate for the language level of the participants. However, some discrepancies were found particularly in those students with a low English level or those who complained about the quality of the audio. The following comments are examples of the aforementioned discrepancies.

Yes, mainly because my English level is very bad. (Focus group 1)

I found difficult to understand certain words. (Focus group 2)

The audio was not great. (Focus group 5)

The sixth question of the structured interview analysed students’ opinions about the flipped learning model and traditional learning. In this question, a disparity of opinions was found depending among the participants. Approximately half of the participants indicated their preference towards the flipped learning model over traditional learning. The rest preferred traditional learning except for a small number of students who indicated their preference towards a mixed model that combined flipped and traditional learning. The following comments present some examples of these preferences.

I would choose the flipped learning model but using Kahoot. (Focus group 3)

I would learn better with the flipped learning model as I can play the video several times. (Focus group 4)

I prefer in-class teaching but in a dynamic and innovative way. (Focus group 5)

I would learn more with videos but in the class. (Focus group 1)

Question number seven of the structured interview analysed the advantages students perceived of using the flipped learning methodology. As mentioned previously, the possibility of watching the videos several times is the most frequent answer among participants. Other participants also suggest factors such as: the possibility of carrying out different activities at the same time; the motivational component of Instagram; the absence of classmates that could distract them; the use of Instagram; the possibility of watching the videos in different locations; and the entertaining characteristics of the flipped learning methodology.

I find Instagram motivating. (Focus group 1)

I can do other things while I watch the video"/ "It's more entertaining. (Focus group 2)

You have more in-class time to practice. (Focus group 3)

You don´t get disturbed by people in the class. (Focus group 4)

You can see the lecture everywhere and through a social network. (Focus group 5)

Question eight tackled the disadvantages perceived by students. The most frequent responses by participants included factors such as the distracting nature of mobile phones and the audio quality. Other factors such as the lack of instant teacher feedback were also pointed out.

You can get distracted with the chat conversations in your mobile phone or watching other Instagram posts. (Focus group 1)

The quality of the audio was poor at times. (Focus group 2)

Sometimes you forget the doubts you had when you watched the video and you cannot ask the teacher in class. (Focus group 4)

Further disadvantages found in a smaller proportion of responses were the length of the videos, the difficulty in understanding the contents, updates in the app or the data plans in some of the devices used by participants. The last question of the structured interview explored possible recommendations regarding the improvement of the videos for subsequent implementations. Factors such as adding subtitles, reducing the length, improving the audio quality and uploading videos more frequently were the most common responses provided by participants.

Uploading the videos with Spanish subtitles. (Focus group 1)

Making the videos shorter and uploading them more frequently. (Focus group 2)

Using Kahoot to evaluate the explanations in the videos. (Focus group 3)

Improving the audio quality of the video. (Focus group 4)

Stop the video in certain parts in order to see the whole explanation. (Focus group 5)

Thus, answering the research question of this investigation, the quantitative and qualitative analyses conducted provide a detailed and largely positive account of students' perceptions. These perceptions will be further discussed and compared with similar studies in the following discussion.

CONCLUSION

The questionnaire yielded positive findings with regard to students' satisfaction with the methodology in line with similar research involving use of a flipped learning approach in the EFL class (e.g., Chen Hsieh et al., 2017; Nouri, 2016). However, students did not feel that the use of this methodology improved their linguistic competence and language skills in comparison with lecture-based classes. This finding contradicts results from similar studies conducted in EFL (e.g., Chen Hsieh et al., 2017) or second language learning contexts (Lim, Kim, & Lee, 2016), and suggests that a flipped classroom model did not imply more effective language teaching or a higher degree of language learning. Owing to the fact that this type of methodology is relatively new, it appears essential to train teachers appropriately to carry out this type of activity. This may contribute to changing students' perceptions with regard to the possibilities of this methodology for language learning as previous studies have already shown the positive effects of flipped learning in terms of motivation and engagement (e.g., Hao, 2016; Yilmaz, 2017).

With regard to the flipped learning model, the advantages of this methodology over traditional lecture-based classes in EFL contexts are also highlighted by the findings of this research. Factors such as the possibility of watching the videos several times, greater autonomy and more in-class practice time (Bergman & Sams, 2012) appear beneficial in supporting learning. Apart from these advantages which are common to any flipped learning context, the ubiquitous characteristics of mobile devices together with the inclusion of a social element provide more opportunities to foster students' engagement. Nevertheless, the characteristics of mobile devices also highlight several potential disadvantages that need to be considered when implementing blended learning models. Factors such as internet connectivity, the distracting nature of mobile devices or poor audio quality may also have an impact on the implementation and development of a flipped learning model. Further specific elements of foreign learning contexts also need to be considered such as the use of subtitles in order to improve the understanding of the L2, in an effort to reduce distractions. Similarly, adjusting the videos to the linguistic competence of the students through stops, emphasis and repetitions also seems a relevant factor, given the impossibility of answering students' questions while they watch the explanations.

Regarding the results of the TAM, the use of Instagram was found to be positive, and motivational as students were already familiar with this app. These findings also correlate with previous studies involving use of Instagram (e.g., Çakmak, 2019, Mansor & Rahim, 2017) which highlighted the potential of the app to foster students' motivation and engagement. However, it also seems necessary to control the distracting nature of this application, which at times gave rise to situations where students stopped watching the videos to explore other posts and videos. Although the results found in this data collection instrument could also be reported in other platforms where flipped learning is viable such as Facebook or Youtube, it is worth emphasizing that Instagram is mainly used through mobile devices which led to ubiquitous access to the contents and explanations. At the same time, the tremendous popularity of the application among students also became a relevant factor in selecting this app as the flipped learning platform in an attempt to improve participants' engagement during the project.

Overall, the implementation of new pedagogical perspectives such as blended learning models in language learning is still a field that requires further investigation. Likewise, research exploring the potential of Instagram to foster language development is very limited. Thus, this chapter attempts to combine these two elements in order to further understand their potential for language development and how to effectively facilitate learning using them. In this context, the information collected in this investigation could be used as a stepping stone towards more in-depth analyses of the learning gains of this type of language instruction. Further lines of research could also investigate the impact of a ubiquitous flipped learning methodology like the one presented in this chapter on students' linguistic competence. Use of an experimental design, control and experimental groups may provide relevant data regarding the differences between flipped and traditional lecture-based instruction. However, in order to effectively implement these approaches, researchers would be well advised to consider the factors identified in this investigation.

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KEY TERMS AND DEFINITIONS

Blended Learning: Style of learning in which students learn through computer and electronic devices as well as through traditional classroom sessions.

Flipped Learning: Type of blended learning methodology that involves viewing teacher's explanations from a computer or mobile device before the class. In-class time is devoted to the evaluation and practice of the contents explained in the videos.

Instagram TV: Functionality of the social networking tool "Instagram" that allows user to record long duration videos that can be subsequently uploaded to users' profiles.

MALL: Mobile-assisted language learning (MALL) is a field of study that investigates the use of mobile devices to foster second language development.

Social Media: Online environments that allow users to share content or participate in social activities through the web.

TAM: The technology acceptance model (TAM) is a scale which is used to explain students' use and behavior towards technological devices and applications.

APPENDIX A (Chen Hsieh, Wu & Marek, 2017)

Please circle the following items.
1 = Strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree

1. A flipped classroom model is a better way of learning.
2. I enjoyed the Flipped classroom teaching approach more.
3. I think the flipped classroom is a more effective and efficient way to learn.
4. I feel more motivated in a flipped classroom.
5. I participated and engaged myself more in learning in the flipped classroom.
6. I became a more active learner in the flipped classroom.
7. I thought the time and effort I spent in the flipped classroom was worthwhile.
8. I learned more and better in the flipped classroom.
9. I prefer the flipped classroom to a lecture-based classroom.
10. I think the flipped classroom learning guided me toward better understanding of the course topics.
11. I experienced pleasure in the flipped classroom.
12. I devoted myself more to the instructional/class activities in the flipped classroom.
13. I spent more time and effort than usual on my flipped classroom learning activities.
14. Generally, I am happy and satisfied with this flipped learning experience.

APPENDIX B: STRUCTURED INTERVIEW

What's your opinion about this methodology?
Do you consider this methodology useful?
Did you have any problem when accessing the videos?
What do you think about the contents of the videos?
Did you have any difficulty with understanding the videos?
Do you think you would learn better with the flipped learning model or with traditional lecture-based instruction?
Advantages of using this methodology.
Disadvantages of using this methodology.
Any recommendation on how to improve the videos to use them in a flipped learning model?

APPENDIX C: TECHNOLOGY ACCEPTANCE MODEL

Please circle the following items.
1 = Strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree

System Characteristics

The use of Instagram provided a realistic learning environment to learn English.
The use of Instagram provided a stimulating learning environment.
I felt comfortable using Instagram to view the theoretical explanations compared to face-to-face tuition.
I could use Instagram to improve my learning due to the teacher's explanations.

Material Characteristics

The audio/video materials made by the teacher led to a better comprehension of the course contents.
The audio/video materials made by the teacher helped me immerse myself in the learning atmosphere of the class.
The audio/video materials made by the teacher were useful to learn the class contents.
The audio/video materials made by the teacher helped learn the most important aspects of the different units.
I believe that the audio/video materials made by the teacher were useful for improving my English level.

Perceived Ease of Use

I received clear guidance about how to use Instagram and view the videos.
Using Instagram did not require much time.
Learning how to use Instagram for the in-class activities was easy.
The visualization of the videos through Instagram was adequate and not stressful.

Perceived Usefulness

Learning through Instagram improved my English skills.
Learning through Instagram enhanced my desire to use the contents learnt.
Learning through Instagram provided a beneficial outcome to this class.
The videos made by the teacher were useful to improve my class work.

Attitude About Use

I like using Instagram to learn English.
I have a positive attitude towards the use of Instagram in this class.
I believe that using Instagram to learn English was a good idea.
I looked forward to using Instagram in this class.

Behavioural Intention

When I use Instagram, I will continue writing in English and following English accounts apart from Spanish ones.
I will continue using Instagram to improve my English level.
I will be happy to use the contents I have learnt when using Instagram.
When I use Instagram, I will have confidence when I participate in conversations in English.

Chapter 8

Using Digital Storytelling to Handle Second Language Writing Anxiety and Attitudes:

A Longitudinal Experiment

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ABSTRACT

Digital storytelling (DST) is an innovative outgrowth of traditional learning/teaching through stories and has gained vast popularity in language classrooms thanks to findings indicating positive impacts on the four major skills. This chapter investigates the influence of DST (i.e., the independent variable) on English as a foreign language (L2) learners' writing anxiety and attitudes (i.e., the dependent variables). Moreover, it examines if engagement in DST affected L2 writing errors. This chapter reports on the findings of a quasi-experimental study that elicited quantitative and qualitative data collected from pre- and post-study questionnaires and learner-created stories. The discussion documents that DST compared to traditional print-based stories reduced L2 writing anxiety while it fostered positive attitudes towards L2 writing. Analysis revealed fewer errors in stories written by a DST group compared to a comparison group over the course of the study period. Accordingly, this chapter proposes practical applications for the integration of DST into L2 writing classes.

INTRODUCTION

Digital storytelling (DST) is the act of creating a multimodal personal story including images, audio and video, which is further shared digitally with others. DST refines the age-old tradition of storytelling via integration of various technological tools and applications. Going beyond a mere translation of written texts (Fulwiller & Middleton, 2012), DST facilitates the communication of spoken and written messages through its enriched format, presentation and distribution modes. In so doing, it serves as

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a viable platform to operationally converge four student-centred learning strategies including student engagement, reflection for deep learning, project-based learning, and technology integration into the classroom (Barrett, 2006). Furthermore, DST empowers underachieving learners who struggle to find a voice in the classroom with a means for expressing their ideas. Considering that numerous learners leave the classroom without actively participating in any learning activity such as discussions or group work (Bull & Kajder, 2004), DST essentially engages all learners in learning activities by asking them to digitally create, visualise and vocalise their own stories. As an integrated task, DST requires learners to perform various roles such as a researcher, playwright, director and editor in order to create their stories. Similarly, it offers ample opportunities to develop and improve a wide range of skills. Robin (2006) provides a comprehensive list of these skills such as research, writing, organisation, technology, presentation, interview, interpersonal, problem-solving and assessment skills.

Though by no means prescriptive, seven elements have been identified as being involved in the creation of effective digital stories. Lambert (2006, 2010) summarises these elements as point of view, a dramatic question, emotional content, the gift of voice, soundtrack, economy and pacing. Point of view implies that digital stories should rely on the learners' own experience, imagination and understanding. A dramatic question is the element that evokes the attention of the audience. It ensures commitment of the audience to the story until its resolution at the end (Lambert, 2006). Emotional content refers to covering salient issues in the story, which have personally salient connotations for the author and audience. Bull and Kajder (2004) maintain that reactions of the audience to the emotional content of a digital story are a key component validating the efforts made by the author. The gift of voice stands for the use of vocal features such as pitch and intonation. The gift of voice is a remarkable way to help the audience understand the story as the author uses it to convey personal meanings and intentions embedded in the story. Soundtrack is the music and other sounds accompanying the story as a means of supplementing its complexity and depth. Economy requires including only sufficient number of texts and audio-visuals into the story without overloading it or narrowing it down. On the one hand, economy makes the construction of digital stories manageable for the author as it helps the author focus only on the essential elements and eliminate the irrelevant ones. On the other hand, economy allows the audience to easily and practically view the story in a short time (Bull & Kajder, 2004). As the last element of DST, pacing refers to rhythm (i.e., fast or slow progression) of the story as an unvaried pace leads to monotony and bores the audience.

In a typical case, a digital story is three to five minutes long with up to 15-20 images (Lambert, 2010; Matthews-DeNatale, 2008). It deals with various topics such as personal accomplishments, memoirs and historical events. Ideally, the process of DST (as followed in the present study) comprises four main phases including planning, production, assembling and sharing (Lambert, 2010; Robin, 2016). In the planning phase, learners determine the purpose and topic of their stories, which further requires them to do extensive research. Then, they write edit and digitise their stories as well as sketching some images that complement them onto a storyboard. Next, they digitally select and assemble the images and audios together with the text through specific software. Finally, they share the stories with audience.

DST necessarily engages learners in a recursive process of writing and editing the story text, recording themselves, working on audio and visual files, and thusly creating a meaningful, authentic digital product (Castaneda & Roja-Miesse, 2013; Rance-Roney, 2008). As a pedagogical tool, it is distinguished from the traditional oral storytelling by the interactivity and digital media it offers learners throughout the DST process (Verdugo & Belmonte, 2007). In the same vein, Gregori-Signes (2008) documented nonlinearity, discontinuity and autonomy as the distinctive aspects of DST. Indeed, such distinction might also feature as an additional challenge during the initial phases of digital story writing because of the novelty of the DST activity (Oskoz & Elola, 2014). However, the audio-visual aspect of DST has a well-proven superiority over what traditional oral or print-based storytelling can achieve (Suwardy, Pan, & Seow, 2013). However, one should note that in DST all the above-mentioned factors; ease of use, and flexibility are subsidiary to learning (Bull & Kajder, 2004; Castaneda, 2013). In other words, the digital facilities associated with DST are secondary while the story itself is primary, which prioritises writing and communication over the mastery of technological effects in learning settings. Hence, educators planning to adopt DST should emphasise student learning over the potentially deceptive charms of the digital aspect of DST.

Despite the noticeably increasing use of DST to foster the four major language skills, there is a dearth of research on how DST may affect L2 writing. Likewise, there is a paucity of empirical findings on the possible role DST may play in shaping and refining L2 learners' beliefs and attitudes about L2 writing. Hence, this chapter sheds light on impact(s) of DST on L2 learners' writing ability. It intends to empirically answer the question about whether engagement in DST influences L2 learners' writing anxiety and writing attitudes. Moreover, it provides a detailed account of how engagement in DST compared to print-based storytelling affects L2 learners' writing errors.

BACKGROUND

In contrast to the common belief that personal uses of technology hardly render themselves for use in educational settings (Franklin, 2007; Selwyn, 2007), DST features as a useful alternative to integrate multimedia technologies into classrooms. This aspect of DST also inspires the integration of DST into different stages of teaching. As a warm-up activity, for instance, a digital story with enriched multimedia can be instrumental in attracting learners' attention and encouraging them to explore new ideas (Robin, 2008). Alternatively, it can serve as a while-teaching activity fostering further discussion about the topics and enhance learners' comprehension of complex or abstract content within a larger unit. Robin (2008) postulated that beyond teacher-created digital stories, asking learners to create their own digital stories gives learners a sound foundation in developing the 21st century skills, which Robin (2008) cited as digital literacy, global literacy, technology literacy, visual literacy and information literacy. Furthermore, Davis (2004) argued that the acts of creating and completing a story as well as subsequent experiences of sharing the story with others harbour unique opportunities for improving the 4Cs of 21st century skills; namely, critical thinking, communication, collaboration, and creativity. Put differently, each act of writing, editing, digitising and sharing the story fosters reflective thought, communicating and collaborating with others, and imagination. In concert with this argument, several other studies affirmed the effectiveness of DST in different areas including learners' digital literacy (Sadik, 2008), academic achievement (Yang & Wu, 2012), motivation (Hava, 2019), 21st century skills (Dogan & Robin, 2008) and problem-solving skills (Hung, Hwang, & Huang, 2012).

Similarly, DST has proven to be a sound facilitator for L2 learning as it provides an engaging platform for learners to practice in various areas of L2 including speaking, writing, grammar and vocabulary. It allows learners with low L2 proficiency to communicate through using the language of digital media (i.e., visuals, sounds, etc.) (Reinders, 2011). Timuçin and Irgin (2015) proposed that DST empowers language learning by fostering learners' efforts to brainstorm and search for information about the selected topic, write, deliver presentations, engage in problem-based tasks, and use multimedia tools. Previous research (Brenner, 2014; Lee, 2014) indicated that DST promoted learner motivation and engagement in learning as it gave learners the pride of preparing a finished product through mastering a variety of tasks. Yang and Wu (2012) specified that the active and creative work embedded in DST made L2 learning more meaningful and valuable for learners. The idea of sharing their products with a broad range of audience promoted further interest in L2 learning (Lee, 2014). Engaging L2 learners in a 9-week DST activity, Hava (2019) documented that DST significantly improved learners' self-confidence in L2 learning, particularly in terms of vocabulary, writing and speaking. Moreover, Hafner and Miller (2011) implemented a collaborative digital video project for an undergraduate English for Science and Technology course. The researchers found out that this DST-enhanced project-based learning implementation was instrumental in promoting learners' autonomy in L2 learning and breaking down the traditional boundaries of classrooms. Furthermore, Tsou, Wang and Tzeng (2006) highlighted that a multimedia storytelling platform where L2 learners composed, replayed and shared digital stories significantly increased overall L2 proficiency along with sound improvement in sentence structures and vocabulary recalls. In an experimental study investigating the impact of DST on speaking skill compared to traditional storytelling, Hwang et al. (2016) also pinpointed that DST supplemented L2 speaking skills more effectively than traditional storytelling because it offered more practice and active learning through the use of not only verbal but also visual means. In another experimental study conducted with 5th grade elementary students, Yoon (2013) showed that DST had positive impacts on learners' reading skills and attitudes towards learning English.

With specific reference to L2 writing, Yamaç and Ulusoy's study (2016) showed that DST prompted learners' willingness to take part in writing practices. Likewise, Castaneda and Roja-Miesse (2013) highlighted that DST improved learners' self-assessment of their writing competence. Delving deeper into reasons underlying the influence of DST on writing competence, Castaneda (2013) referred to the drafting and editing process as a significant factor improving L2 learners' writing. Moreover, Robin (2016) emphasised the role of scripts and storyboards as a specific strength of DST in boosting learners' writing competence. Following a didactic sequence to teach linguistic routines such as greetings and leave-takings in an English as an L2 course, Reyes Torres, Pich Ponce and Garcia Pastor (2012) indicated that along with clear signs of improvement in linguistic routines, student-created digital stories as the final product of the course included more complex structures and a large variety of expressions for opening and closing conversations. Figg and McCartney (2010) used a specific model of DST which divided digital stories on the basis of difficulty into five types including (from simplest to most difficult) descriptive, photo essay, sequential, narrative and interactive. The researchers delineated that engagement in DST activities marked a significant growth in at-risk learners' L2 writing performance in addition to their vocabulary development. Considering the challenges of learning L2 writing such as a good command of grammar rules, spelling, punctuation and capitalisation, Keşli Dollar and Tekiner Tolu (2015) presumed that DST might prove instrumental in overcoming those challenges.

Confirming the abovementioned claim, several researchers (Keşli, Dollar, & Tekiner Tolu, 2015; Yamaç & Ulusoy, 2016) found a positive influence of DST on L2 writing performance. Reporting on a case study with 5th grade Turkish learners of English, Keşli Dollar and Tekiner Tolu (2015) noted that DST contributed to learners' writing performance in terms of discourse, language and creativity. In the same vein, Reyes Torres et al. (2012) asserted that regarding the use of linguistic routines, DST enabled learners to make sentences with more complex structures and a wide variety of expressions while it reduced grammatical and lexical mistakes in L2 learners' written productions. Yamaç and Ulusoy (2016) also documented a significant increase in the total word counts of L2 learners' writing as well as an overall improvement including ideas, organisation, word choice, sentence fluency and conventions in their written productions.

By nature, DST is based on active learning (i.e., it requires learners to actively participate in all phases of digital story production and thus learn by doing). In a study with Singaporean university students, Suwardy et al. (2013) underlined that DST encouraged even less motivated learners as it provided opportunities for open-ended discussions, decision-making and meaningful feedback. Furthermore, Erben, Ban and Castaneda (2009) premised that DST helped learners notice and correct their errors. In this regard, DST emerged as a viable alternative to traditional methods of learning/teaching L2 writing. A large number of studies (Gregory, Steelman, & Caverly, 2009; Seifeddin, Ahmed, & Ebrahim, 2015; Warren, & Dondlinger, 2009) reported significant contributions of DST to L2 learners' writing performance compared to traditional writing courses. Gregory et al. (2009) reiterated that DST provided learners with a better understanding of English composition courses as well as fostering their scores. In this context, DST has emerged as an effective pedagogy for improving achievement in L2 writing.

Given the specific focus of this chapter, L2 writing anxiety refers to the overall tendency to avoid engagement in writing activities. As a prominent obstacle hindering effective development of L2 writing skills, writing anxiety is associated with feelings of fear, apprehension and tension that obstruct L2 learners' minds during writing and cause low quality productions. Previous studies identified several factors as possible reasons/sources for L2 writing anxiety. Cheng (2004) revealed that instructional practices in L2 writing classes (such as assigning unfamiliar topics and giving unreasonably short time for completing a writing task) formed a major source of L2 writing anxiety. Lack of sufficient practice in L2 writing appeared as another major source of high levels of L2 writing anxiety (Karakaya & Ülper, 2011; Lee & Krashen, 2002). Similarly, Latif (2007) claimed that perceived lack of L2 knowledge, low L2 competence, and self-esteem along with fear of others' evaluation played a sound role in promoting L2 learners' writing anxiety. In the same vein, a plethora of research documented significantly negative correlation between writing anxiety and L2 writing achievement/performance (Cheng, Horwitz, & Schallert, 1999; Yavuz Erkan & İflazoğlu Saban, 2011), practice (Al-Ahmad, 2003) and self-efficacy (Klassen, 2002; Martinez, Kock & Cass, 2011). Accordingly, learners with high levels of L2 writing anxiety espouse a stronger tendency to fail as they spend less time and effort on writing activities (Daly & Miller, 1975; Faris, Golen, & Lynch, 1999).

ISSUES, CONTROVERSIES AND PROBLEMS

Learning an L2 is a source of extensive tension for most learners as the target language is merely considered a school subject to be passed rather than a means of communication. Similarly, there is little opportunity to practice L2 outside the classroom, where mostly teacher-centred, traditional methodologies are used to teach L2. Probing into causes of failure in effective L2 education, Haznedar (2010) summarised that the main problems lie in ignorance about individual learner differences, lack of learner motivation, limited time devoted to L2 teaching and crowded classrooms. It is also of vital importance to integrate most recent theoretical developments into L2 practice (Haznedar, 2004). Furthermore, it is essential to take into account the cognitive and affective dimensions of L2 learning in order to supplement learners' achievements. In this respect, there is a dire need to refine L2 teaching in a way to include instructional techniques and methods which (a) engage learners in active use of L2 for authentic communication purposes not only inside but also outside the classroom, (b) tap individual learner differences to catch learners' attention, (c) make use of educational technologies to motivate learners to keep trying, and (d) promote positive attitudes, beliefs and feelings through fun and entertaining L2 learning practices.

In the light of the need for instructional techniques and methods for effective L2 education, DST surfaces as an innovative pedagogical tool to foster achievement. As the first step of constructing digital stories among the four phases of DST mentioned above, planning essentially requires L2 learners to practice through their L2 because they discuss with peers, the teacher or significant others about the purpose and topic of their stories. In the second step, learners reflectively use the L2, as they write and edit the text of their digital stories, which involves contemplating grammatical rules, sentence structures, mechanics of writing (punctuation, capitalisation, etc.) and vocabulary in order to appropriately convey messages. To digitise their stories in the third step, L2 learners actively speak in the medium of L2 so that they can vocally record the text and match these audios with images. Once learners digitally share their stories as the last step of DST, use of L2 both in written and oral formats peaks because the learners have to reply to the questions from the audience about their stories, which may either be asked orally in the classroom or written virtually as comments posted under the digital product. As a result of the mastery of all these tasks in each step, DST stands out as a major instructional enhancement to traditional L2 teaching methods in that it allows learners to actively practice and communicate in the L2 and progress at their own pace during the construction of their digital stories. Furthermore, it boosts L2 learners' motivation and positive thoughts and feelings about L2 learning since it gives them a sense of achievement through the digital output they produce at the end of the process.

The following discussion will document an original research study in order to give an empirical example of how teachers can integrate DST into actual classrooms, in particular L2 writing classrooms. This research study reports impact(s) of using DST on L2 learners' writing anxiety beliefs and attitudes along with their writing errors. The study aimed to answering the following research questions:

1. Does engagement in DST compared to traditional storytelling elicit a statistically significant difference in L2 writing anxiety beliefs?
2. Does engagement in DST compared to traditional storytelling elicit a statistically significant difference in L2 writing attitudes?
3. Does engagement in DST compared to traditional storytelling affect L2 writing errors?

METHOD

Participants

The study comprised 83 participants enrolled in the Foreign Language (English) II course in the spring semester of 2017-2018. Studying as undergraduates at social sciences education and primary school education departments, the participants followed the same content taught by the same instructor and attended the course for three hours a week. There were 24 males in total and the rest were females. The participants in this study were between 18 and 22 years old, with an average age of 19.2 years old. Selected through convenience sampling, all the participants were freshmen at a small public university in the central Anatolia region of Turkey. They had English courses since the 4th grade of primary education and were elementary level learners. None of the participants had previously taken preparatory class with intensive English courses or specific writing training. Nor had any of the students had experience in a

DST activity prior to the implementation. For the purposes of the present study, the participants were divided into study and comparison groups. While the study group involved 40 participants, the latter group had 43 participants.

Instruments

The study employed both quantitative and qualitative tools to collect data. While the Second Language Writing Anxiety Inventory (SLWAI) (Cheng, 2004) and Writing Attitude Scale (WAS) (Podsen, 1997) elicited quantitative data, three digital stories written by the participants provided qualitative data. The SLWAI consisted of 22 Likert-type items anchored from strongly disagree (1) to strongly agree (5). Seven items (i.e., 1, 4, 7, 17, 18, 21, 22) were negatively worded and thus, required reverse-coding. A higher score on the SLWAI represented higher anxiety about writing in the L2. Using Cronbach's coefficient alpha, Cheng (2004) reported high reliability (.91) for the SLWAI. Furthermore, the WAS measured the participants' attitudes towards writing in English. The WAS contained 20 Likert-type items anchored from strongly disagree (1) to strongly agree (5). Eight items (i.e., 1, 4, 5, 6, 11, 14, 15, 19) in the WAS were reverse-coded due to negative wording. With a possible score range of 20-100, a higher score on the WAS conveyed more positive attitudes towards writing. Previous studies (Ansarimoghaddan & Tan, 2014; Setyowati & Sukmawan, 2016) confirmed high reliability for the WAS.

Serving as the source of qualitative data, a total of three (digital) stories written by the participants throughout the study period were collected to gain insights about possible changes in the participants' writing performance. In the light of Lambert's (2010) suggestion, the stories were expected, but not mandated, to include 250-300 words. Regarding the topics of the stories, the participants as a group were granted the freedom to choose their own topics with the hope that the DST experience would best serve the participants' interests and maximise their engagement. The topics for the first to third stories were culture, sports and nature, respectively. The stories were analysed using a rubric (see Appendix A) adapted from previous research (Arıkan, 2006; Beyreli & Arı, 2009; MiraCosta College, n.d.). The rubric broadly focused on four components including content/organisation, sentence structure and vocabulary, grammar/mechanics, and format/legibility.

Procedure

Once the study and comparison groups were determined, the researcher administered the SLWAI (Cheng, 2004) and WAS (Podsen, 1997) to pre-test the participants' beliefs about L2 writing anxiety and L2 writing attitudes. Throughout the study period which took 12 weeks and 36 hours of instruction in total, the instructor played the role of facilitator who kept track of the participants' progress and offered help whenever necessary. Before the participants in the study and comparison groups began to write their stories, an ICT specialist working at the same faculty with the researcher provided the study group with an intensive training on DST. With the awareness that some participants might lack sufficient digital literacy skills (Sadik, 2008), the ICT specialist elaborated on certain issues about DST process including how to create effective digital stories, what to include in the stories, which software, hardware and applications to use, and how to find/create digital audios and visuals for the stories. The ICT specialist also introduced some free-to-use video editing programs including *WeVideo, VivaVideo, Openshot and Windows Movie Maker*. Moreover, she provided sample digital stories so that the participants could gain familiarity with features of high-quality digital stories. Overall, the training was delivered in two consecutive weeks with six hours of instruction in total.

Following the training, the study group proceeded with creating their own digital stories while the comparison group followed the traditional sequence of writing print-based stories. For all the three digital stories, the creation process comprised two phases. The first phase, which was completed in the classroom, required the study group to write the scripts of their individual stories together with a storyboard (see Appendix B for sample storyboards). At this phase, the instructor adopted a recursive and interactive writing model because this enabled the participants to constantly revise and refine their stories through peer and instructor feedback. In the second phase, the participants digitised their stories through one of the abovementioned video editing programs in the computer lab, where the instructor and ICT specialist collaboratively scaffolded the participants' digital productions. The participants in the study group shared these digital productions, which took the form of videos with still images and the participants' own voiceover recordings, on a digital platform (i.e., Edmodo) so that their peers could watch and comment on them. As to the comparison group, they wrote all the three stories in the classroom, where the instructor assisted and monitored their story writing process. The participants in the comparison group wrote their individual stories on paper without access to any technological facilities (such as word processor spell checking or online dictionaries) in order to ensure that any changes in their L2 writing anxiety beliefs, L2 writing attitudes or errors were a direct result of engagement in the traditional print-based storytelling. Once they finished writing each of the three stories, the participants in the comparison group read out the final version of their stories in the classroom so as to share them with other class members. At the end of the study period, the researcher administered the SLWAI (Cheng, 2004) and WAS (Podsen, 1997) again in order to elicit the participants' post-test writing anxiety beliefs and writing attitudes in English.

Design and Data Analysis

The study adopted a quasi-experimental design with a study group and a comparison group. This longitudinal study employed pre-test and post-test measurements of the participants' L2 writing anxiety and writing attitudes as the dependent variables while engagement in DST versus traditional print-based storytelling served as the independent variable. To analyse the quantitative data collected through the SLWAI (Cheng, 2004) and WAS (Podsen, 1997), the researcher administered the independent samples *t*-test on SPSS Version 23.0. Preliminary to *t*-test analysis, the researcher conducted tests of normality and ensured that the Shapiro-Wilk, skewness and kurtosis values (see Table 1) apart from the *q*-plot tests confirmed no violation of the normality assumption. To analyse the qualitative data elicited through (digital or traditional) story scripts, the researcher conducted error analysis with the help of the aforementioned rubric. For this analysis, the researcher identified and sorted out the participants' errors based on the categories given in the rubric. He counted the number of errors in each category as well as the total number of errors along with the total number of words in each story. These were then presented graphically in order to evidence the participants' progression in terms of their writing proficiency/achievement throughout the study period.

Table 1. Tests of normality

	Shapiro-Wilk			Skewness		Kurtosis	
	Statistic	**df**	**Sig.**	**Statistic**	**Std. Error**	**Statistic**	**Std. Error**
WASpre	.995	165	.828	-.022	.189	-.121	.376
WASpost	.991	165	.393	.078	.189	.422	.376
SLWApre	.991	165	.393	.208	.189	-.102	.376
SLWApost	.993	165	.587	.072	.189	.078	.376

FINDINGS

Holding positive beliefs and attitudes towards writing in the target language plays a pivotal role in ensuring learners' success. The independent samples *t*-test analyses in the study showed promising results for the use of DST regarding the participants' L2 writing anxiety beliefs and writing attitudes. The results indicated that while the study and comparison groups were homogenous at the beginning of the study ($p = .971$), there was a statistically significant difference ($p = .019$) between their L2 writing anxiety beliefs at the end of the study (see Table 2). Hence, this finding suggested that the study group engaged in DST felt significantly less anxious about writing in L2 than the comparison group, who followed traditional print-based sequence.

Table 2. Pre- and post-test L2 writing anxiety beliefs

	Group	*N*	*X*	*SD*	*t*	*df*	*p*
Pre-test	Comparison Study	43 40	3.0972 3.1020	.48 .67	-.037	81	.970
Post-test	Comparison Study	43 40	3.0472 2.7330	.69 .48	2.425	81	.019

With respect to the participants' attitudes towards L2 writing, the study showed significant results in favour of the study group. More specifically, the results indicated that there was a statistically significant difference ($p = .050$) between the post-test L2 writing attitudes of the study and comparison groups while there was no significant difference ($p = .975$) between the two groups at the beginning of the study (see Table 3). This finding verified that given the increase in the study group's mean score following the study, engagement in DST positively contributed to the participants' attitudes towards L2 writing.

Table 3. Pre- and post-test L2 writing attitudes

	Group	*N*	*X*	*sd*	*t*	*df*	*p*
Pre-test	Comparison Study	43 40	3.0679 3.0732	.72 .81	-.031	81	.975
Post-test	Comparison Study	43 40	3.0341 3.2976	.62 .58	-1.986	81	.050

Furthermore, the analysis of the stories written by the participants corroborated the statistical difference. Despite fluctuations from the first to third story, the total number of words in all the three stories was largely similar for the study and comparison groups (see Figure 1). Likewise, the changes in the number of errors steadily declined throughout the study period (see excerpts 1-4 below for examples of errors in the participants' stories). Yet the decline in the number of errors appeared to be more noticeable for the study group than the comparison group (see Figure 2). While the comparison group hardly corrected one third of their errors from the first story (1069 errors) to the last (668 errors), the study group made a far greater progress by correcting over two third of their errors from the first story (946 errors) to the last (312 errors).

Excerpt 1: *We going to Singapore together with my brother* (quoted from Ahmet's 1st digital story)
Excerpt 2: *Me and my friend for holiday we were come North Pole* (quoted from Ali's 2nd digital story)
Excerpt 3: *We going to go very different a home* (quoted from Ruken's 2nd print-based story)
Excerpt 4: *Gizem likes animal and nature. So bes documentary producer* (quoted from Furkan's 3rd print-based story)

Figure 1. Total word counts of the stories

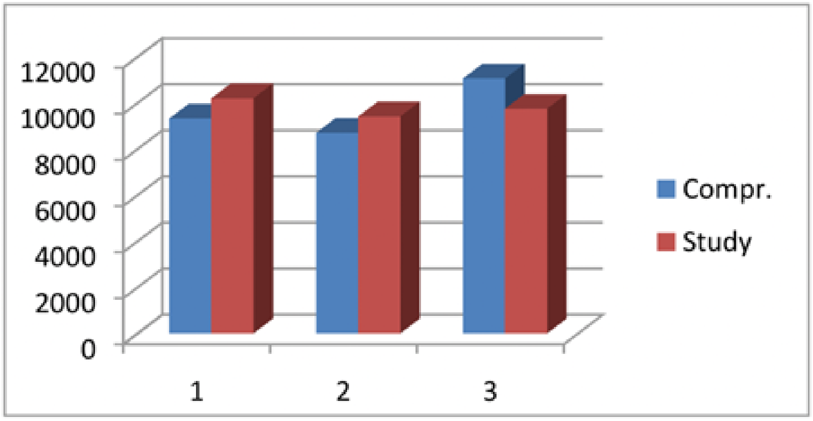
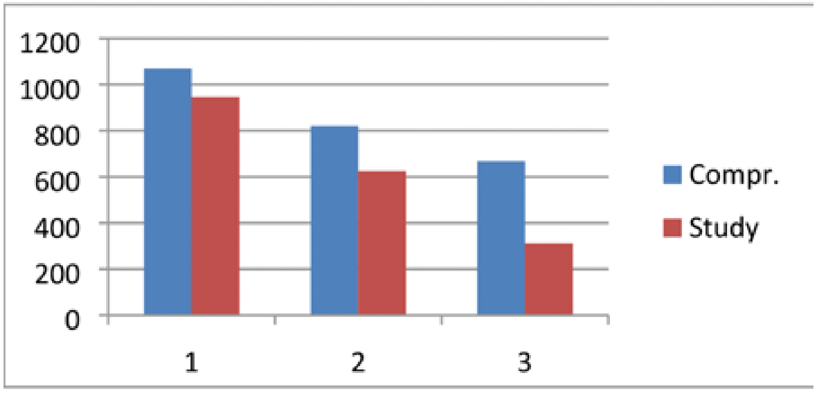


Figure 2. Total number of errors in the stories



Furthermore, the study probed deeper into the changes in each category of errors in the student-created stories so as to document contribution(s) DST versus traditional print-based stories could make to the correction of learner errors. Results showed that the study and comparison groups showed major overlaps in terms of the changes in error categories as there was a steady decrease in the number of errors in all the four categories (see Figures 3-5). Similarly, grammar/mechanics and sentence structure and vocabulary featured as the main challenges for both groups given that the participants made the highest number of errors in these two categories throughout the study. Finally, format and legibility seemed to be the least problematic error category for both groups because the participants made the fewest number of errors in this category.

Figure 3. Number of errors in the first story

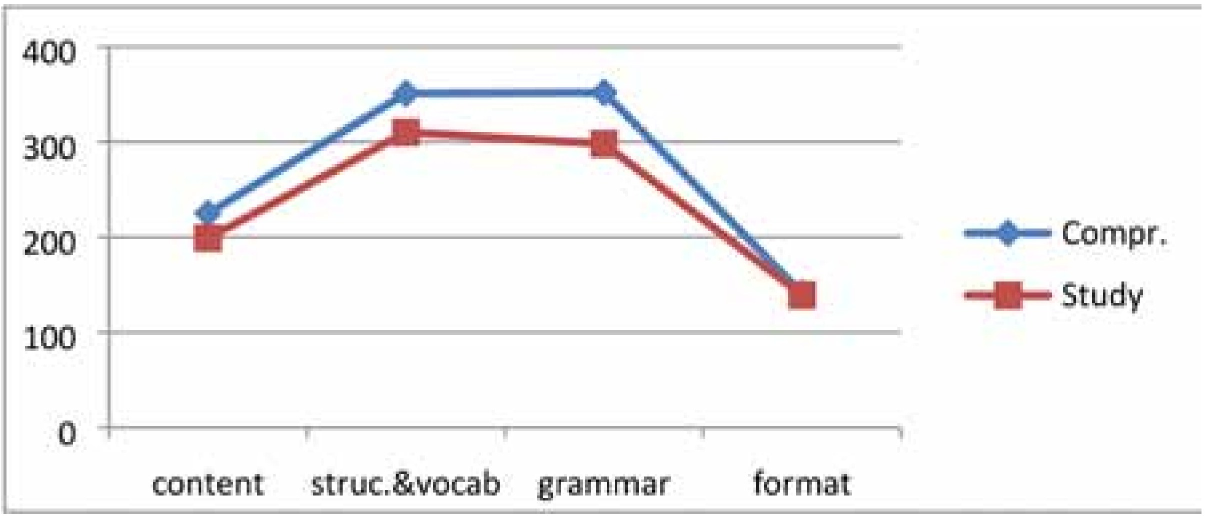


Figure 4. Number of errors in the second story

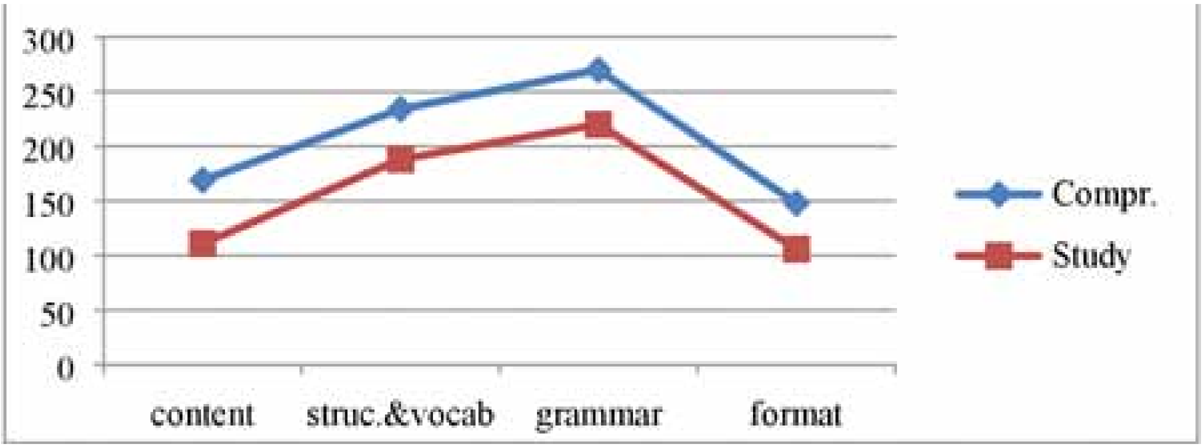
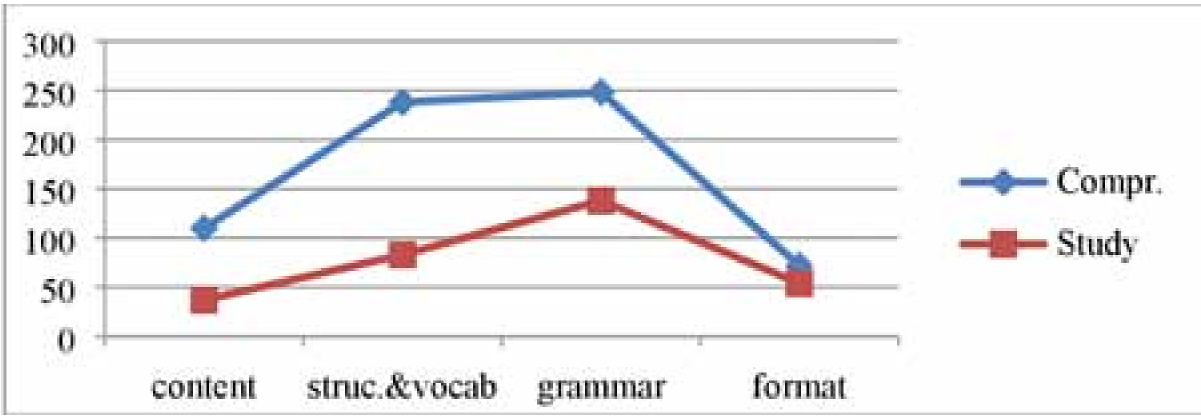


Figure 5. Number of errors in the third story



SOLUTIONS AND RECOMMENDATIONS

This research study revealed interesting results favouring the integration of DST into L2 writing classes. First and foremost, the study pinpointed that DST contributed to reducing L2 writing anxiety as the participants engaged in DST expressed significantly less anxiety about L2 writing than those dealing with the traditional print-based stories. There may be several reasons underlying this significant difference between the study and comparison groups in terms of their anxiety beliefs. As underlined by previous research (Brenner, 2014; Lee, 2014), the fact that they could create three digital stories despite the challenging task of writing in L2 might have strengthened the DST group's confidence in their L2 writing ability. Moreover, Cennamo, Ross and Ertmer (2010) reiterated that the active learning processes in DST including researching, writing and sharing provided salient writing experiences. Engagement with such experiences through DST might have promoted the participants' reliance on actual strengths rather than perceived fears and anxiety beliefs about writing in the target language. Accordingly, findings suggest that DST should be integrated into L2 writing classrooms in order to refine learners' perceptions of their writing skills and decrease their writing anxiety.

Furthermore, this study highlighted that DST proved instrumental in fostering positive attitudes towards L2 writing because the DST group had significantly more positive attitudes than the traditional print-based group at the end of the study. The audio and visual nature of DST might have prominently affected this difference given that the participants in the DST group not only worked with mere texts but also enjoyed the opportunity to employ auditory and visual materials to enrich and better communicate their messages. This probably made L2 writing through DST a more appealing option than the traditional print-based stories (Suwardy et al., 2013). Similarly, the ease and flexibility of working with DST might further account for the significant increase in the DST group's attitudes towards L2 writing (Castaneda, 2013). Hence, the results indicate that DST might significantly improve L2 learners' attitude towards writing, which would ultimately contribute to their L2 learning achievement (Hung et al., 2012).

Error analysis of the stories written by the participants throughout the study also yielded valuable insights into the progress in the participants' actual writing performance. Although both groups showed similarities regarding the total word counts, error types proving to be the most/least problematic, and direction of the changes in their error types, the study and comparison groups differed remarkably in terms of the progress they made in correcting their errors. More specifically, the DST group appeared to perform better than the traditional print-based group in reducing the number of errors. This finding connoted with the assertion that mode of learning (i.e., digital or print-based) had a significant influence on learner achievement (Tsou, Wang, & Tzeng, 2006). The remarkable progress the DST group made in correcting their errors throughout the study further verified previous DST studies (Keşli Dollar & Tekiner Tolu, 2015; Reyes Torres et al., 2012; Yamaç & Ulusoy, 2016), which reported stronger L2 writing performance including higher complexity and variety in sentence structure, word choice and sentence fluency. Additionally, storyboards might have been another key component in the remarkable decline in the number of errors the DST group made in each category because they enabled the participants to be more actively engaged in the writing and editing process (Rahimi & Yadollahi, 2017; Robin, 2016). Overall, the progress the DST group made in reducing their errors along with the improvement in their L2 writing anxiety beliefs and attitudes confirmed that DST could be a sound enhancement to traditional writing classes (Erben et al., 2009; Gregory et al., 2009). The findings of the study essentially imply a refinement in L2 writing curriculum through the integration of DST into the writing classes.

FUTURE RESEARCH DIRECTIONS

The research study reported in this chapter did not include an analysis of the digital videos created by the participants. Although this might be considered a limitation, the fact that the study prioritised actual learning and the joy of working with digital tools over the technical quality of the digital stories can compensate for such a limitation. Given the positive findings this study has reported regarding the integration of digital stories in L2 writing, further research may investigate the influence of DST on other skills. In particular, studies examining how DST may affect speaking may reveal implications for teaching L2 speaking as DST essentially includes speaking through requiring learners' voiceover recording of their stories. Moreover, investigation of DST to promote learning L2 vocabulary may make a major contribution to work on L2 learning in that there is a dearth of research on vocabulary learning in a DST context. In the same, the present study did not investigate the impact of listening to voiceover recordings on L2 listening skills despite requiring the participants in the DST group to read out their digital stories. Hence, examining possible impact(s) of DST on L2 learners' listening skills may yield promising findings regarding how listening and re-listening of learners' own recordings of voiceovers affects their L2 listening skills. Moreover, further research that investigates the possible impact of engagement in DST on the development of overall L2 proficiency may yield important results.

As research on educational uses of DST has expanded recently, the impact of employing different DST models for L2 writing such as the one introduced by Figg and McCartney (2010) merits investigation. Given the promising results obtained from this empirical research which was conducted with pre-service teachers, future research may probe into the integration of DST and other digital tools into pre-service teacher education programs. Although many pre-service teacher education programs emphasise uses of educational technologies in courses like 'Instructional Technology and Material Development,' redefining this emphasis by embracing DST within the framework of the technological pedagogical content knowledge (TPACK) model (Mishra & Koehler, 2006; Thompson & Mishra, 2008) is of great importance. In this regard, attempts to examine how DST affects pre-service teachers' attitudes towards learning and teaching the L2, motivation to learn the L2, and perceptions of teaching English as an L2 may offer practical insights for the development of more effective pre-service teacher education programs.

Finally, most research studies on DST reflect the impact of DST use on various variables only for the time of measurement, which in turn stimulate questions about sustainability of the DST integration into educational settings. Clearly, future research should focus on whether the findings reported in this study can be sustained over time, and what factors may possibly facilitate/debilitate sustainability. Furthermore, the role of different stakeholders in education including administrators, teachers, students and parents in promoting sustainability over time warrants future research.

CONCLUSION

This chapter reported on a longitudinal experiment involving DST on learners' L2 writing anxiety and attitudes. Though studies pointing out advantages of educational technologies abound in the literature, this study was significant in that it clearly documented the positive changes in L2 writing anxiety and attitudes along with practical indicators of progress in L2 learners' writing errors as a result of engagement in DST. The results showed that DST could make a major contribution in reducing L2 writing anxiety. The fact that DST provides L2 learners with ample opportunities for writing may help learners overcome their perceived fears and concerns regarding L2 writing. The extensive time and effort L2 learners invested on writing the first and revised drafts of the final version of their stories enabled them to develop a more realistic assessment of their writing abilities. Likewise, creating storyboards with visual depictions of stories further ensures active engagement with the writing process and forms a stepping-stone for progress in writing ability. With such progress, L2 learners may feel affirmed of their capacity and establish their beliefs about L2 writing on actual progress rather than hearsay, fears or concerns.

Furthermore, DST fosters positive attitudes towards L2 writing as exemplified by the significant improvement in the attitudes of the DST group compared to the traditional print-based group in the abovementioned research study. Along with the audio-visual nature and perceived ease and flexibility of DST, the idea of sharing digital stories lays the groundwork for cultivating in learners more positive attitudes towards L2 writing. In essence, sharing the stories with significant others (e.g., peers, teachers and parents, etc.) is highly likely to make the learning process more meaningful and valuable for L2 learners because it obviously boosts learners' efforts to create flawless stories. Furthermore, giving L2 learners freedom in topic selection, maximises learners' sense of ownership, thereby promoting more positive attitudes towards the L2 writing process.

Finally, DST has the potential to reduce and eliminate errors in L2 writing. As this study suggests, practice in L2 writing regardless of the mode (i.e., digital or print-based) does contribute to the reduction of writing errors to some extent. However, DST provides L2 learners with a safer and more appealing platform to make significantly fewer errors. First and foremost, writing storyboards and multiple drafts of digital stories evidently enables learners to focus deeply on various aspects of their stories including complexity, variety in sentence structure, word choice, sentence fluency as well as cohesion and coherence. Similarly, DST relieves L2 learners of the painstaking endeavour of correcting writing errors by themselves. The possibilities for eliciting feedback from significant others before and after digitally sharing stories promotes learners' noticing and correction of writing errors, which in turn improves their achievement in L2 writing. As a direct result of the deeper focus on various aspects of writing and higher likelihood of noticing and correcting different types of errors, DST promises stronger achievement rates in L2 writing. Overall, the empirical findings regarding the significant decline in L2 writing anxiety and writing errors coupled with significantly more positive L2 writing attitudes pinpoint a need for refining L2 writing curricula through the integration of DST.

Given the teachers' role in affecting learners' development, however, one should note that no attempts to integrate DST into L2 writing classrooms can be successful without paying due heed to the teachers' attitudes towards integration into their classes. In this regard, it is vital for pre-service teacher education programs to exemplify how DST as an outgrowth of the TPACK model can be used in the classroom with a specific emphasis on improving learners' overall L2 development including writing, speaking, listening and reading. Moreover, pre-service teacher education programs should further investigate the potential DST holds to contribute to L2 learners' cognitive and affective development. As the discussion in this chapter has shown, DST represents a promising pedagogical tool to foster learners' motivation, attitudes, self-confidence and the development of the 21st century skills.

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KEY TERMS AND DEFINITIONS

Digital Storytelling: The act of creating and digitally sharing a multimodal personal story including images, audio and video.

L2: Second or foreign language learned by users of another mother tongue. In the case of this chapter, L2 stood for English.

Traditional Storytelling: The act of writing and orally sharing a personal story without any audio-visual components.

Writing Anxiety: Feelings of tension, apprehension or fear about writing.

Writing Attitude: Feelings and perceptions one has about writing.

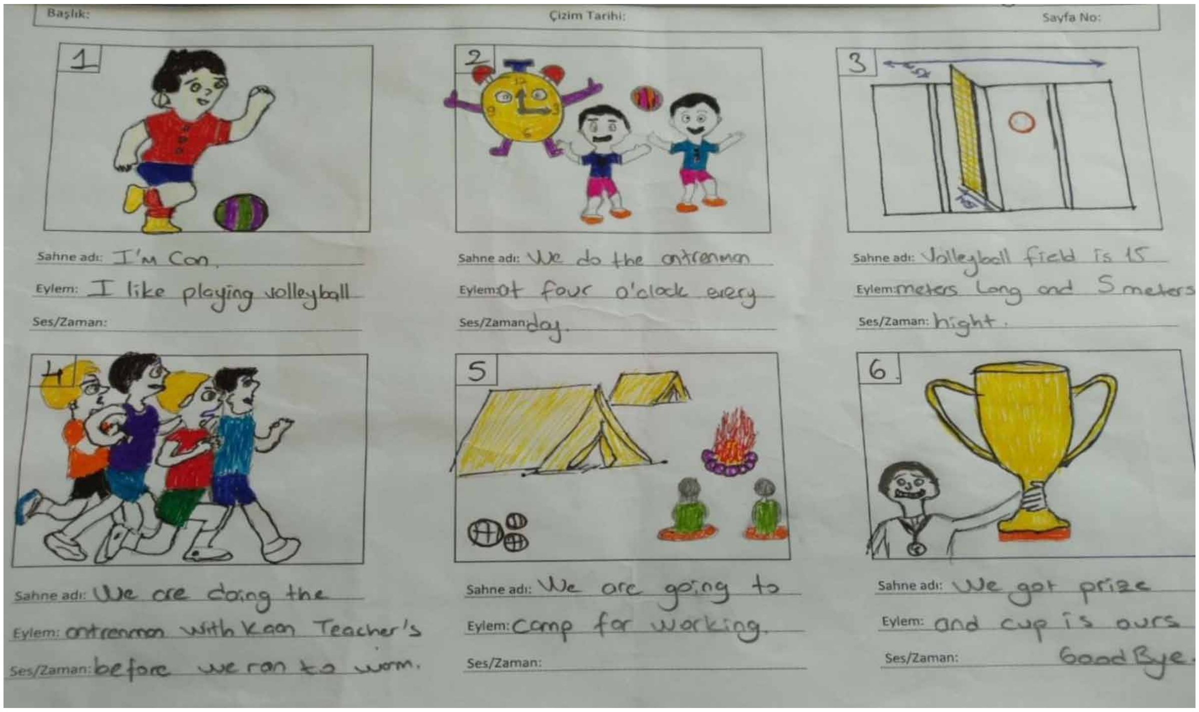
APPENDIX A: RUBRIC FOR ASSESSMENT OF STORIES WRITTEN BY L2 LEARNERS

Table 4. Rubric for assessment of stories written by L2 learners

	Number of errors
Content/Organisation (Topic sentence, supporting sentences, concluding sentence, all sentences on topic)	
Sentence Structure & Vocabulary (Variety of sentence, correct vocabulary use, variety in word choice)	
Grammar & Mechanics (Tenses, punctuation, spelling, capitalisation)	
Format & Legibility (Appropriate margins, neat and legible, standard format with centred title)	
Total Word Count	

APPENDIX B: SAMPLE STORYBOARDS

Figure 6.



Başlık:
Çizim Tarihi:
Sayfa No:

1
Sahne adı: I'm Can.
Eylem: I like playing volleyball
Ses/Zaman:

2
Sahne adı: We do the antrenman
Eylem: at four o'clock every
Ses/Zaman: day.

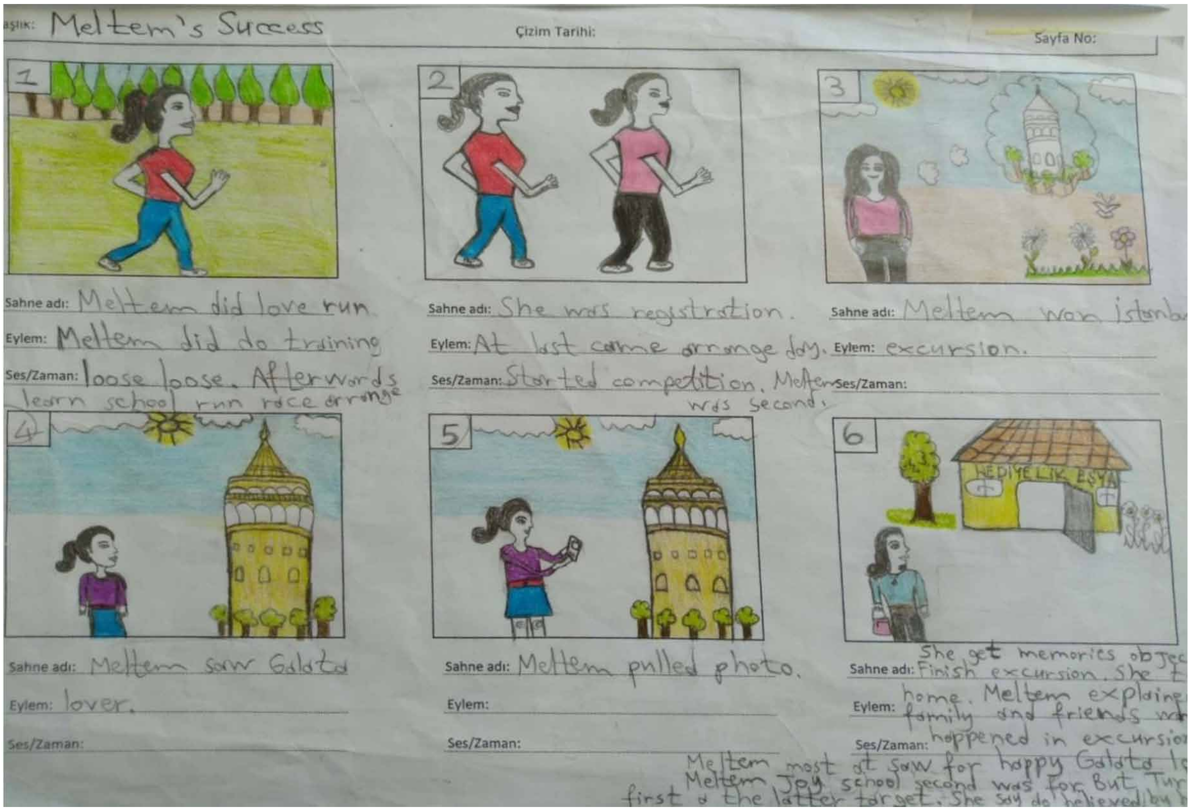
3
Sahne adı: Volleyball field is 15
Eylem: meters Long and 5 meters
Ses/Zaman: hight.

4
Sahne adı: We are doing the
Eylem: antrenman with Kaan Teacher's
Ses/Zaman: before we ran to worm.

5
Sahne adı: We are going to
Eylem: camp for working.
Ses/Zaman:

6.
Sahne adı: We got prize
Eylem: and cup is ours
Ses/Zaman: Good Bye.

Figure 7.



aşlık: Meltem's Success
Çizim Tarihi:
Sayfa No:

Sahne adı: Meltem did love run
Eylem: Meltem did do training
Ses/Zaman: loose loose. Afterwards learn school run race arrange

Sahne adı: She was registration.
Eylem: At last came arrange day.
Ses/Zaman: Started competition. Meltem was second.

Sahne adı: Meltem won istanb
Eylem: excursion.
Ses/Zaman:

Sahne adı: Meltem saw Galata
Eylem: lover.
Ses/Zaman:

Sahne adı: Meltem pulled photo.
Eylem:
Ses/Zaman:

Sahne adı: She get memories objec Finish excursion. She t
Eylem: home. Meltem explaine family and friends w
Ses/Zaman: happened in excursio

Meltem most at saw for happy Galata l
Meltem Joy school second was for But Tur
first & the latter target. She say do believed by h

Chapter 9

Students' Perceptions Toward an International Telecollaboration Project Through an Engineering-Themed Online Simulation in a Language-Learning Setting

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ABSTRACT

This chapter investigates student perceptions toward an international collaboration that involved an online role-play simulation, Engineers Without Borders (EWB). Forty-two undergraduate students enrolled in an engineering course at a university in the United States were paired with 56 engineering students based at a university in Spain. The simulation was designed and developed not only to foster problem-solving skills, but also to provide opportunities for participants to develop communication skills, teamwork, and professionalism. The simulation also provided opportunities for EFL students to communicate in English and develop their intercultural skills through the use of a variety of electronic collaboration tools. This chapter reports on participant feedback and highlights the benefits of the computer-based nature of the telecollaboration.

INTRODUCTION

This article describes an innovative CALL-based study undertaken in response to changes in engineering education, following the release of new program criteria from the Accreditation Board of Engineering and Technology (ABET). ABET's newest criteria give much greater emphasis to "soft skills" such as communication, teamwork and professionalism, which has led to dramatic changes in engineering curricula.

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As global trends have created major changes in the way the world does business (Geithner & Menzel, 2016), they have also created similar changes in the way engineering projects are carried out (Felder, Brent & Prince, 2011; Parkinson, 2009; Rutta, 2015). Universities are modernizing their curricula to enable their graduates to succeed in the global marketplace (Ayokanmbi, 2011) in which they work, with colleagues who have similar skills but different values and ideas (Ravesteijn, DeGraaf, & Kroesen, 2006). Despite the attention to ABET criteria, engineering faculty are still relying heavily on outdated teaching models (Sheppard, Macatangay, Colby, & Sullivan, 2008). Grandin and Heddrich (2009) suggest that it is important for engineering students to "go out of their comfort zone and seek authentic experiences" (p. 368) in order to be competitive in the global marketplace. They suggest that "international internships or projects" would help prepare students for the engineering jobs of the future (p. 369). May and Tekkaya (2016) and Yu (2012) agree that transnational collaboration is critical if students are to develop language skills and sensitivity. However, this is less likely to be accomplished, according to Killen (2015) by using the lecture format for delivering engineering education. He maintains that the lecture format should be replaced with more student-centered activities, especially "role plays, games, case analysis, collaborative projects and in-class simulations" (p. 479). Latucca, Bergom and Knight (2014) concur, claiming that student-centered classrooms "are associated with greater student engagement and achievement than are traditional lecture-based, instructor-centered approaches" (p. 550). Such activities are more likely to encourage students to "think critically, creatively, and outside the box" (Ziemiewski, 2009, p. 8) and, foster "communication, teamwork, and creativity" (Bodnar, Anastasio, Enszer, & Burkey. 2016, p. 147), some of the most desirable skills for engineering graduates (Passow, 2012).

A number of researchers have pointed out the need for engineers to learn to work collaboratively in multicultural or transnational teams (Downey et al., 2006; Felder, Brent, & Prince, 2011; May, Wold, & Moore, 2014; Moore, May, & Wold, 2012). Passow and Passow (2017) assert that engineers' understanding of technical considerations "is inseparably intertwined with team-player collaboration" (p. 475). In addition, researchers have stressed the importance of communication skills (Larkin, 2015; Mills & Treagust, 2003). Parkinson (2009) outlines 13 dimensions of global competence, and stresses the importance of appreciating other cultures and being able to communicate across them. He maintains that global competence can be developed if students collaborate on projects with teams in another setting or culture. If they have had an opportunity to work together and to collaborate in a "service learning opportunity, a virtual global engineering project or some other form of experience" (pp. 12-13), then they will more likely be ready for the kinds of real-life experiences they will encounter on the job.

BACKGROUND

Intercultural competence is of utmost importance in the age of globalization. It has been traditionally defined as "a complex of abilities needed to perform effectively and appropriately when interacting with others who are linguistically and culturally different from oneself" (Fantini & Tirmizi, 2006, p. 12). Intercultural competence has usually been regarded as one of the possible outcomes of a study or stay-abroad experience. These experiences have the potential of facilitating intercultural encounters that contribute to the development of participants' intercultural competence to different degrees (Cots, Aguilar, Mas-Alcolea, & Llanes, 2016; Messelink, van Maele, & Spencer-Oatey, 2015). The importance of intercultural competence is increasing in English language teaching. Byram (1997) proposes an intercultural-competence model that includes the following components: linguistic competence, sociolinguistic competence, discourse competence, knowledge, skills of interpreting and relating, skills of discovery and interaction, intercultural attitudes, and critical cultural awareness. According to Byram's intercultural model, language is intertwined with culture, community, and society. Consequently, in order for their students to become competent intercultural speakers, educators should promote intercultural competence among English language learners (Byram, Gribkova, & Starkey, 2002).

As a result of globalization, engineering students are now being trained to work collaboratively on multidisciplinary teams with colleagues from around the world. One benefit of such collaborative teamwork is that "students work on assignments and projects in teams under conditions that assure, among other things, individual accountability for all the learning supposed to take place" (Felder & Brent, 2004, p. 289). Shuman, Besterfield-Sacre, and McGourty (2005) point out that this trend for the inclusion of team-based courses reflects industry practice. They also suggest that within such a team-based approach to teaching, projects with global and humanitarian components have become quite prevalent. A key benefit of this approach is that it helps students acquire "higher-level thinking and problem-solving skills" (Felder & Brent, 2004, p. 289).

In acknowledging that engineering education has changed to reflect the times, Shulman (2005) refers to the juxtaposition of the formal engineering requirements involved in learning math and science with what he calls "the creative challenges that accompany 'messing with the world'" (pp. 11-12). For May et al. (2014), it is important for students to be able to "show respect to other students, recognize differences, adjust their behaviors, and integrate others' ideas when making group decisions" (p. 18). This can only happen in student-centered classrooms where the importance of teamwork is stressed. Geithner & Menzel (2016) agree that such skills "can hardly be developed through traditional forms of academic learning" (p. 250). Although Downey et al. (2006) stress the importance of studying and working abroad, they suggest introducing a simulated environment into the classroom so that students can practice interacting with engineers from other countries. Moore, May and Wold (2012) and May et al. (2014) acknowledge the difficulty of providing all students with international experiences. Since international internship experiences are not feasible for all students, participating in a simulated internship with international components is possible and entirely more practical. According to Moore et al. (2012), "when designed to create interactive, engaging learning across nations, online education can support joint international experiences that develop cultural competency without requiring the time and expenses that are often a barrier for students" (p. 1). It is also realistic to expect students to accomplish tasks as members of assigned teams, since "engineers often work in teams and they hardly, if ever, have to make a decision on their own" (Doorn & Kroesen, 2013, p. 1516). Thus, collaborative work assigned in class is entirely appropriate in preparing students for their professional careers.

Simulation was chosen as the method for this project because simulations have been used for many years to promote critical thinking, collaborative learning and intellectual engagement with a topic (Kovalik & Kovalik, 2007; Salies, 2002a; Schick, 2008). Simulations such as *Awarding Admissions and Scholoarships* (Saeli & Mirshahidi, 2013) BULLYING (Halleck, 2008a), *Global Crisis Conference* (Smythe, 2002), *Lottery* (Shleykina, 2013), *Malaysian Language Planning* (Hayden, 2007), *The ITA Problem* (Halleck, 2008b), *Verichip* (Yun, 2013), *Whaling: Tradition or Murder?* (Kamimura & Tjie, 2002), and *World Population* (Kovalik & Kovalik, 2013) have provided an excellent structured series of activities in which students participate in authentic situations (Garcia-Carbonell, Rising, Montero & Watts, 2001; Halleck, 1995). Therefore, simulations have helped improve students' skills in collaboration (Geithner & Menzel, 2016; Hill, 2007; Killen, 2015; Knyshevytska & Hill, 2007). They have also helped enhance critical thinking (Knyshevytska & Hill, 2007; Kovalik & Kovalik, 2007; Salies, 2002a, 2002b, 2007) and intercultural communication (Crookall & Landis, 1992; Halleck & Coll-Garcia, 2007; Knyshevytska & Hill, 2007; Wiggins, 2012).

Such simulations have also been used effectively in 4-skill ESL/EFL classes (Codita, 2013, 2016; Halleck, 2007; Halleck 2008, 2008b). According to Codita (2016), the use of such simulations "creates a learning environment conducive to practicing and improving the four communicative skills as well as engaging students to explore challenging topics" (pp. 685-686). Thus, simulations provide opportunities to practice both the "soft skills" (i.e., communication, teamwork, intercultural competence) stressed by engineering educators, and the "four communicative skills" (i.e., reading, writing, speaking, listening) that are the focus of ESL/EFL courses.

The novelty of this exploratory research with respect to similar studies on transnational collaborations lies in the conjunction of three facts: (1) this study measures engineering students' attitudes towards both teamwork and international collaboration on the one hand and towards their participation in a simulation at tertiary education level on the other; (2) learners had to participate in a transnational telematic simulation where student interactions were carried out through a combination of synchronous and asynchronous communication tools; and (3) students were asked to work in mixed-nationality groups, where the simulation objectives where the same but the learning outcomes differed based on the students' nationality.

This chapter aims at providing answers to the following research questions:

1. What were students' perceptions towards teamwork in a transnational project designed to accomplish a wide range of instructional objectives (Cf. "Treatment" section) carried out telematically?
2. How did students feel about their collaboration with international students (i.e., collaborators from other cultures) whose mother languages are different?
3. How did students feel about using a simulation in order to cover the instructional objectives set for them?

METHODOLOGY

This study was a one-shot case study (Campbell & Stanley, 1963), the design model being as follows: X O1 (A), whereby O1 (A) = Attitudinal survey and X = Treatment. This section focuses on the study subjects, treatment, technology, instruments and data analysis.

Subjects

As far as the study subjects are concerned, two groups of students from two different countries, namely the U.S. and Spain, were paired to facilitate not only the component of teamwork but also multiculturalism. To do this, 42 undergraduate engineering students enrolled in an engineering course (i.e., *Introduction to Chemical Processing*) at a university in the U.S. collaborated with 56 undergraduate engineering students in Spain who were enrolled in an English-for-Science-and-Technology course.

The reasons for having the American students participate in such an international project was to help fulfill the ABET requirements/objectives for a Chemical Engineering degree. In accordance with ABET requirements, the project allowed the students to undertake a variety of activities including working in multidisciplinary teams, understanding professional and ethical responsibility, recognizing the need for, and an ability to engage in life-long learning, and gaining knowledge of contemporary issues. The Spanish students participated in this study to practice and improve their foreign language skills. The English proficiency level of Spanish students was in the intermediate/lower-intermediate range. Despite this, the Spanish students were not provided with support materials such as glossaries, sentence openings or similar.

The students were assigned to work together in teams (i.e., a mixed team of 3 American students and 4 Spanish students). They had to imagine that they were members of the local chapter of Engineers Without Borders at their university. Their instructions were that during the weeks when the simulation took place, they had to think, speak and act as if they were truly planning an EWB mission. They were supposed to make their documents and their conversations with their international partners as realistic as possible. In other words, they were supposed to consider the factors that they would be faced with in the real world, and anticipate the costs, communication problems, and possible setbacks.

Treatment

A simulation, *Engineers Without Borders* (EWB), was designed with the ABET criteria in mind. EWB is an international organization of engineers whose mission "is primarily to provide support for communities in the developing world, by applying a broad range of engineering principles to generate sustainable solutions in challenging settings" (Jaeger & LaRochelle, 2009, para. 1). The subjects were invited to participate in an online simulation for two weeks.

The EWB simulation required the teams to participate in a virtual humanitarian mission. Full international project instructions for the online pilot study are provided in Appendix 1. Their first task was to choose the project in which they wanted to participate. They were given a list of twelve potential projects, taken from the *Engineers Without Borders* website, to decide what types of engineering background would be required. The task-based activities of this simulation required participants to cooperate in the decision-making process and thus "foster the development of teamwork" (Halleck, Moder, & Damron, 2002, p. 331), an enterprise that both engineering educators and ESL researchers see as an important element of successful classroom interaction.

After the groups agreed on the selection of a project, their next task was to select a project leader. They were given a total of eighteen simulated curricula vitae of available engineers. These CVs included civil, chemical, electrical and mechanical engineers with a variety of professional experiences. To select a leader, the subjects first met in small face-to-face groups of 3 to 4 students, and then in the larger online multicultural groups of 7. After making their selection, their next task was to write a letter inviting this engineer to join them. In the letter they had to explain why they had chosen him or her and include a brief explanation of the humanitarian mission highlighting the qualities they felt made this person ideally suited for their expedition. The students were reminded that the letter was supposed to persuade the project leader to join them.

After completing the invitation letter, their next task was to seek funding for the mission. To aid them in this aspect of the simulation, participants were given a description of several international funding sources including Rotary International Humanitarian Grants, UNICEF, ActionAid and the Bill-and-Melinda-Gates Foundation. They had to decide which mission statement best matched the goals and benefits of the project they had chosen. Their written request for funding had to include an overview of the project and an explanation of how the funds would be used.

The next phase of the simulation involved creating an advertisement in the form of a one-page flyer that could be placed on bulletin boards on campus, to recruit college students to join the humanitarian mission. The students were reminded to mention a number of factors in their flyers, such as the information that would be most important to potential recruits, stressing the aspects that would be most enticing for a prospective volunteer, and the benefits associated with their project.

After these phases were completed, the students had to fill out a project plan form with a number of questions (see Appendix 2) and hand in the completed project package, which consisted of the following: a letter of invitation, a request for funding, and a sample of the student advertisement they created. Because a portion of their grade for this project had to do with their communication with other group members, each group had to compile online chat records. The chat records were available and could be downloaded and printed. Students were asked to include all the chats that had taken place between any group members.

Technology

Concerning the technology used to carry out this project, the initial session took place through a group videoconference in two conference rooms in both Unversitat Jaume I, Spain and Oklahoma State University, U.S. This 30-minute teleconference allowed team members to "meet" their international partners at the beginning of the project and organize the work ahead. Essentially, the scope of the project was set during the first part of the assignment. Subsequent collaborations between the American and Spanish members of each team took place online. Thus, students were able to communicate with their international partners using *Google Sites* in order to chat, post comments and post documents. Everyone was expected to communicate with the other group representatives on a regular basis via synchronous and asynchronous means of communication available within *Google Sites*.

Instruments

Two instruments were designed and developed to gather the attitudinal data necessary to fulfil the research objectives of the study, namely a Likert-type attitudinal survey, and a semi-structured written interview with open-ended questions.

Likert-Type Attitudinal Survey

A survey was developed to obtain attitudinal feedback on the project. The survey consisted of 11 questions, nine of which (cf. questions 1-9) required a response on a 10-point Likert-type scale, where 1 elicited extremely negative feedback, while a score of 10 indicated an extremely positive response. The remaining two questions (cf. 10-11) dealt with the amount of time each individual spent on the project. Question 10 provided the following 3 possible answers: (a) 0-2 hours, (b) 3-5 hours and (c) 5+ hours. Question 11 allowed participants to choose among these three options: (a) 0-1 hour, (b) 2-4 hours, and (c) 4+ hours. Table 1 below shows the survey questions as well as the variables associated with each question. In addition, students were given the possibility to provide additional written feedback on the project.

Table 1. Likert-type attitudinal survey questions

Item	Questions on the survey	Variable name
1	How well do you feel you communicated with your group at your home institution?	*IntraGroupComDomest*
2	How well do you feel you communicated with the international students in your group?	*IntraGroupComInternat*
3	What is your overall perception of the effort made by of your international collaborators?	*InternatStsEffort*
4	What is your perceived attitude toward the international students?	*InternatStsAttitude*
5	How were collaboration efforts made by your international group members?	*InternatCollabEffort*
6	How were collaboration efforts made by your domestic team members?	*DomestCollabEffort*
7	How satisfied are you with the results of this project on the basis of international collaboration?	*InternatCollabSatisfac*
8	How willing would you be to alter your communication methods with the international students if you had to do the project over again?	*CommunicatTools*
9	How would you rate your overall experience?	*OverallSatisfac*
10	How many hours did you spend on the project outside of class?	*OutClassWorkTime*
11	How many of those hours were spent working in your group?	*GroupWorkTime*

Semi-structured Written Interview with Open-ended Questions

Table 2 below shows the semi-structured attitudinal questionnaire with open-ended questions that was also administered after the last phase of the simulation procedure, in order to elicit attitudinal data.

Table 2. Semi-structured attitudinal questionnaire with open-ended questions

1	What were your expectations regarding this project?
2	Were you concerned about the language and cultural differences between the Spanish team members and the US team members?
3	Did your team accomplish its tasks efficiently?
4	What would you suggest to improve the project?
5	What did you learn from this experience?

Data Analysis

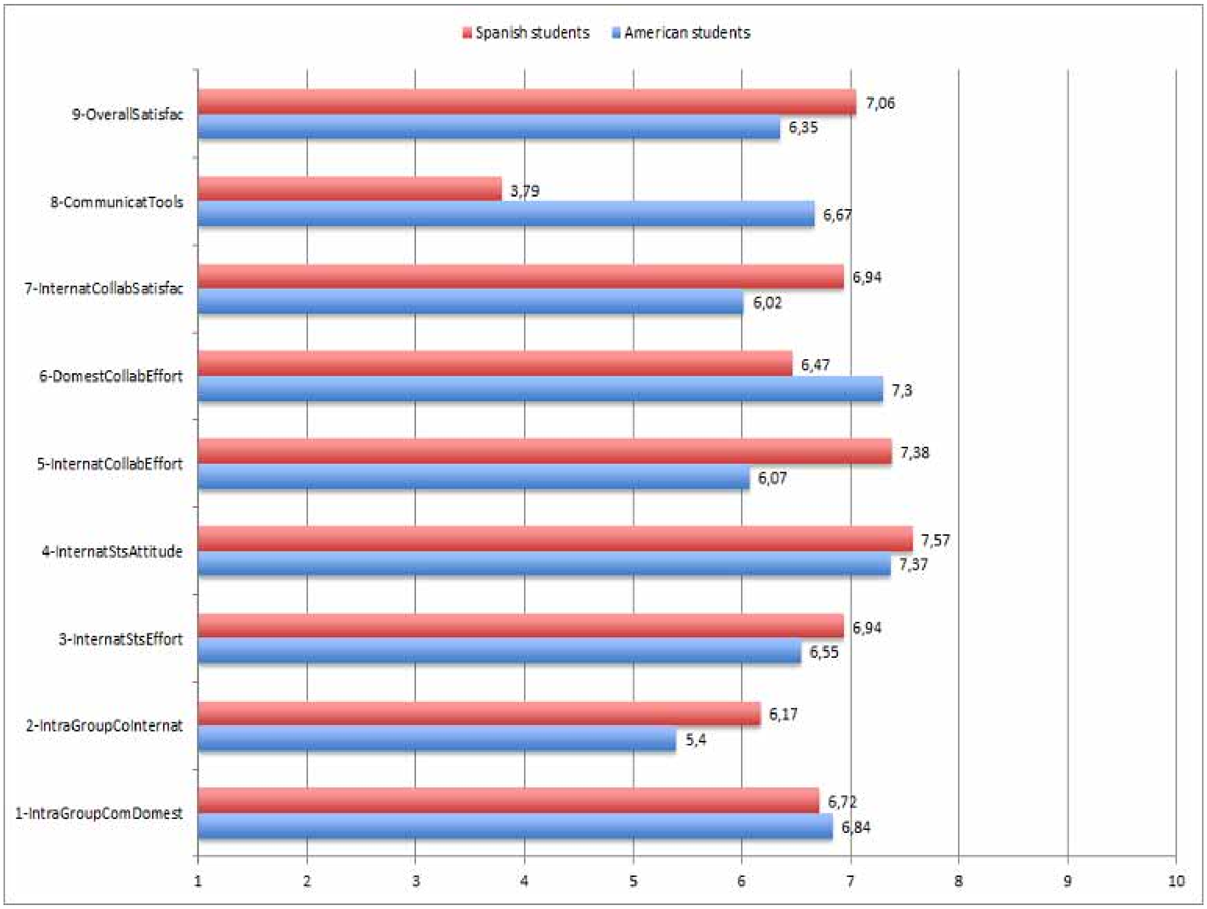
A total of 98 completed Likert-type attitudinal surveys and 98 semi-structured written interviews with open-ended questions were used for analysis. Forty two of them belonged to the American group and the remaining 56 to the Spanish group. The Likert-type attitudinal surveys were coded numerically using SPSS/DE software. Descriptive statistics, and more specifically mean scores for the study variables were obtained using the procedure FREQUENCY from the SPSS/PC software. The written interviews with open-ended questions were analyzed following a qualitative approach in order to complement the results obtained in the Likert-type attitudinal surveys.

RESULTS AND DISCUSSION

Responses Elicited from the Likert-Type Attitudinal Survey

Figure 1 presents the attitudinal mean scores obtained from both Spanish and American participants.

Figure 1. Comparison of Spanish and American students' attitudinal average mean scores



The average mean score in the *IntraGroupComDomest* item ($M = 6.72$) suggests that overall, the Spanish participants felt they communicated quite well with their fellow participants. An average score of 6.84 out of 10 in this variable indicates that the American students' overall opinion about the communication they had with their fellow classmates was also positive. However, when looking into the responses actually given, it was noteworthy that there were many nine's and eights's as well as responses in the rage between five and one, which indicates that the responses on this item were not homogeneous.

The result obtained in the *IntraGroupComInternat* item ($M = 6.17$) indicates that the Spanish students overall felt they communicated quite well with the U.S. students, but not as well as they communicated with one another. An average mean score of 5.4 in this item indicates that the American students' overall opinion about the communication with the international students was slightly positive.

The mean score obtained in the *InternatStsEffort* item ($M = 6.94$) suggests that the Spanish students thought the U.S. students made a considerable effort towards the project, but it also suggests that they thought the U.S. students could have done more as well. A score of 6.55 out of 10 in this question suggests that, overall, the American class believed that the international students made a good or at least an acceptable effort toward the project. However, the fact that the resulting mean score was closer to five than to 10, might indicate that there were students whose international partners did not seem to make such a great effort toward the project. A mean score of 7.57 in the *InternatStsAttitude* item suggests that the Spanish students thought the U.S. students were nice and friendly towards them. The mean score of this item ($M = 7.37$) indicates the American class also perceived their international partners very positively in terms of being friendly. Results for the *InternatCollabEffort* item ($M = 7.38$) reveal that the Spanish students believed the U.S. students made efforts at collaborating. A mean score of 6.03 out of 10 in this item suggests that overall, the U.S. class believed that they did an acceptable job at communicating effectively with their international partners. One of the reasons why the average mean score was not higher, and therefore closer to 10, might be the issue some participants had with timing and actually talking with their team members:

It was difficult to get the projecct done thoroughtly because the group never met and our communication consisted of posting messages on Google and waiting 3-4 hours for someone to relpy. I believe that if there was a greater effort to meet at the same time, the project would have turned out better.

Six point four seven was the mean score obtained in the *DomestCollabEffort* item, which indicates that the efforts made by the domestic members of the Spanish team were reasonable. The fact that this number is lower than the response obtained in the *InternatCollabEffort* item implies that the Spanish students thought that the U.S. students did a better job overall in their efforts toward collaborating for the project than their own Spanish fellow students. As suggested by the score obtained in the *DomestCollabEffort* item (M=7.3), the American class thought they communicated better with their domestic teammates rather than with their international partners since the score was higher than what was reported for the *InternatCollabEffort* item (cf. Item 7). Of course, this was expected since it is easier to communicate and meet with team members that lived nearby.

A score of 6.94 out of 10 in the *InternatCollabSatisfac* item indicates that, overall, the Spanish students were satisfied with the project, but it is evident from this response that there is still room for improvement. A mean score of 6.02 in this item indicates that, overall, the American students were fairly satisfied with the results of the project. However, 48% of the students asserted that they would like to see some improvements made in the project should they do it again in the future. The mean score for the *CommunicatTools* item ($M = 3.79$) suggests that the Spanish students were satisfied with the way they were communicating. It also suggests that if they were to do the project over, they would not necessarily change the communication tools. The average mean score in the this item ($M = 6.67$) suggests that, in general, the U.S. class would change how they communicated with their team members if they were to do this project again. According to the mean score obtained in the *OverallSatisfac* item ($M = 7.06$), overall, the Spanish students were pleased with the experience gained throughout the project. The average mean score in this item ($M = 6.35$) indicates that the overall experience for the U.S. participants was positive, although there were some of the American students who did not enjoy the project. The Spanish students' responses in the *OverallWorkTime* item reveal that 24 out of 36 (i.e., 67%) stated that they had spent from three to five hours working on the project outside of class. Similarly, 27 out of the 43 American students (i.e., 63%) reported they had spent from three to five hours working on the simulation outside of classs. When the Spanish respondents were asked how many of those hours were spent working in their own group (i.e., *GroupWorkTime* item), it was found that 24 out of 36 (i.e., 67%) stated that of the time they had spent working on the project, two to four hours had been spent working with their groups. Twenty four of the 43 American students (i.e., 56%) reported they had only spent one hour at the most working with their group members.

Responses Elicited From the Semi-Structured Written Interview With Open-Ended Questions

When asked what their expectations were when they learned that they would participate in an international project, students from Spain expressed hope that they would improve their English language proficiency by interacting with a group of American students:

When the teacher told us that we were going to do this simulation, I thought it would be interesting because it would help us to improve our oral English. We would probably learn vocabulary that is useful to us in our working lives. Also thought that such work would be useful to learn how to organize the task in groups.

My greatest expectation was to improve my English and learn how to act in that language in a real job related to engineering. Besides, I hoped to learn teamwork and interact with other students from Oklahoma.

In light of the Spanish learners' testimonies, it is clear that they were not only expecting to improve their proficiency level in the foreign language by communicating with team members in English, but also were looking forward to learning how to work as part of a team in a collaborative way with the people from a different culture, thus enhancing their professionalism. The Spanish students were most excited about their participation in this project because of these expectations.

When asked what their expectations were when they learned that they would participate in an international project, the American students were not very optimistic:

I figured there would be language issues. I expected to have to work through the barrier. I thought it would be interesting and a different project than others I have done before

I expected the work to be involved with the members from the other country. I didn't really expect to learn a lot other than a feel for how it is to work with people who aren't living in your culture.

These negative expectations on the part of some American students prior to the beginning of the project were probably related to anticipated language issues between American and Spanish students, and were likely due to a feeling that the outcome of the simulation in terms of contents learned would be poor.

After having analyzed their answers, it could be inferred that the Spanish students felt that communication with the American students might sometimes be troublesome, especially when interacting face-to-face, as this Spanish student pointed out:

At the beginning I was concerned because our level of oral English is not good, but since most of the work was done by e-mail this concern disappeared. Cultural differences I am not concerned about.

The Spanish students felt that communication was a barrier and that more time should have been scheduled for group interaction as well as organization.

Most of the interactions between the two groups were carried out by means of online written communication. This was regarded positively by the Spanish students since they felt less threatened than when they had to interact face-to-face in real time with native speakers of English, since their proficiency in English was at the intermediate level (i.e., equivalent to a B1 level in the Common European Framework of Reference, Council of Europe, 2011). When a Spanish student was asked whether he was concerned about language and cultural differences between the Spanish team members and the U.S. team members, he answered:

No, I was sure that the job would require a major effort from both groups to achieve understanding and teamwork between the two, but I was sure that we would achieve a good result.

The American students showed negative perceptions when communicating with Spanish students. They faced numerous problems when completing assignments with the Spanish learners due to a poor command of the English language on the part of the latter. This resulted in a major increase in workload on the part of the American students –some of them felt they were doing the work of the Spanish students– which turned out to be overwhelming for some of them, as this student points out:

I became concerned that the Spanish team couldn't write well enough English to be of much value on this project. Everything written had to be rewritten in order for us to get a proper grade.

Despite this, the American students tried to integrate the Spanish participants in the group and collaborate with one another. They came up with strategies such as distributing work or setting up deadlines to collaborate as effectively as possible with their international partners, since the grade obtained would be based on their joint outcome:

We included the other team from Spain as much as we could, though the three of us separated out tasks pretty well to sort out the work.

When an American participant was asked whether he was concerned about language and cultural differences between the Spanish team members and the U.S. team members, he answered that cultural differences were not an issue. The language barrier did not seem to be an issue either, as the excerpt below shows:

I was a little concerned because no one in our group spoke Spanish. I didn't worry too much about cultural differences. All those worries were gone after our videoconference though, because I realized that our language barrier wouldn't be as great as I thought. I did feel bad though, since we didn't even try to speak Spanish.

The Spanish students showed a high degree of satisfaction after having participated in this international collaboration. As a matter of fact, overall, the Spanish students had slightly more positive attitudes towards their experience with the simulation than the American students. They found that their participation in the project helped them improve their English, as can be seen in the following opinion:

The experience has been positive. We have learned to organize ourselves as a team and we have learnt specific language related the project itself.

The American learners did not find their experience with the online role-play simulation relevant to their curriculum. One of the students from the U.S. complained that the project did not teach them any engineering concepts. He obviously had not heard about the trend in engineering education to stress the importance of international collaboration and problem solving:

The biggest problem is that there weren't any engineering principles applied during the project. I'm not exactly sure how to fix that other than not using the project in a class where you are supposed to be learning and applying critical thinking and engineering concepts.

Some students believe that "soft skills" are not part of the curriculum. They are only concerned about new knowledge. However, they need to gain a different perspective and learn to look at things from a distance in order to see the whole picture.

Another factor that seems to have affected the attitudinal results of the survey in a negative manner was the 7-hour time difference between the U.S. and Spain, which may have added to the difficulties involved in the successful completion of collaborative group tasks.

Additionally, the Spanish learners were satisfied with the communication channels used with their international teammates, and therefore expressed no wish to change them in future simulations. When asked whether they had any suggestions for improvement, one student from Spain suggested that more time should be devoted to the simulation:

I think the project is very good and you do not need many changes because we had fun doing it. Maybe I would extend it so there was time to produce a better result.

Although the communication tools provided through *Google Sites* were user-friendly enough and acceptable for accomplishing the simulation objectives, a few students reported negative perceptions towards *Google Sites.* They would have liked to work with a simpler platform to be able to navigate in an easier manner.

Finally, some comments concerning the technological resources available for the international project should be made. Some participants experienced problems while others had great success with either *Google Sites* or the teleconference. Overall, it seems that the quality of the resource depended on how well the group organized their work schedule. For example, one of the international groups made an effort to schedule times to chat on *Google Sites*, thus greatly benefiting from this platform. Other groups used *Google Sites* to post drafts of the project documents as well as to write messages for all group members to see. This collaboration method was effective with some exceptions. The American participants never knew if all of the Spanish team members were reading the messages because it only seemed like one or two of the Spanish students actually responded on the *Google-Sites* platform. With *Google Sites*, there is no way to guarantee participation from all group members. Regardless of this, most of American participants felt that the site was simple enough to use and was an effective way for the group to communicate as opposed to attaching files and e-mailing group members back and forth. The teleconference, on the other hand, was an essential resource for the project. Although some participants had difficulties with the teleconference, other groups outlined much of their work plan through the conference. Some groups reported aiming to get the initial parts of the project completed at the teleconference. The teleconference was, however, awkward at first and it seems that all students felt that if there was either more time to plan for the teleconference or more teleconferences available in general, this means of communication would have been more successful.

In response to the question, "What one thing did you learn from this experience?", one of the Spanish students pointed out the positive aspects of the international collaboration:

I could learn to work with people from other countries and I have learnt to work in teams in a real situation of the working life of an engineer.

The international collaboration was, thus, perceived by Spanish learners as something positive. They also enjoyed teamwork and having the opportunity to put into practice professionalism in the field of engineering. In a further response to the above question, the American students claimed that they came to appreciate the importance of communication in general and the significance of cross-cultural communication in particular:

I learned about communication. I feel that communication is important not only in cross-cultural collaboration but when working on any project. Our ability to talk about the work and divide it up was, in my opinion, our greatest asset.

As engineers we need to learn how to explain ourselves concisely, using diction that will allow people to be able to understand clearly. The Spanish group didn't have the best English, so we had to work on what we said to them.

CONCLUSION

It is noteworthy that the overall average responses from the Spanish students were more favorable toward the project experience than the responses from the U.S. students. This may partially be because the project was more related to the objectives of the class the Spanish students were in (i.e., an English-for-Engineering class), than it was to the *Introduction-to-Chemical-Processing* class.

The project was challenging and involved a lot of work on the part of all participants. However, all the goals were finally attained. Despite all the difficulties, learners from both nationalities felt that their teams accomplished their tasks efficiently. All in all, the general consensus of the Spanish students was that the project was useful for learning English. The Spanish students also felt that a second teleconference would have been useful. Finally, the Spanish participants found *Google Sites* was difficult to navigate. The first two comments from the Spanish students relate to one another. The Spanish students wished to improve their oral communication in English through the teleconference and would recommend more face-to-face interaction in order to do so. It was believed that the working platform used could have been simpler, but the communication tools that were provided were perfectly acceptable for the simulation as they were user-friendly for students in both countries.

Overall, the general consensus from the American students feedback resulted in the following sentiments about the international project on the part of the students: communication problems with the international students was the number-one issue; additionally, the students wished to have more teleconference time, or more time to plan for the teleconference; also, relevance to the engineering curriculum was unclear during the project; and finally, the students felt burdened by the workload caused by the poor English of the Spanish students.

Based on the findings of this study, several factors will be altered if the simulation is conducted with another group of students in the future. All in all, the project aimed at contributing to more efficient student written communication in multidisciplinary groups with international members. The project's execution, however, may have lost some of the core values it aimed to emphasize. Based on the surveys from both the American and Spanish students, recommendations can be implemented in order to alleviate some of the problems highlighted by this exploratory-research study. These are by no means a full set of recommendations, but merely a set a suggestions that could be carried out in subsequent international collaborations.

One of the main problems with the project was that the American students were confused when the project was introduced in class. They did not seem to understand what the real learning objectives of the simulation were. The students from Spain understood that such an international collaboration would be beneficial to them, at least in terms of improving their oral and written proficiency in English. However, it was not until the end of the project that the American students fully comprehended what the objectives of the Spanish students were. These were to improve English communication skills in relation to engineering. Had the American students known this from the very beginning, it might have enabled them to avoid some of the frustrations that occurred because of the Spanish students' lower proficiency in English. Instead, they would have been more willing to help these students with technical vocabulary and they would have been more responsive to their written documents. If the objectives of all parties involved in the project had been explained to all students in the beginning, it is likely that they would have been more satisfied with the final results of the project.

Moreover, the American students initially failed to see the connection between the contents of the simulation and the syllabus for the course they were taking. Following the international project, the American students spent part of one class period discussing how the assignment was relevant to their engineering curriculum and how it complied with ABET accreditation criteria. After the discussion, the class collaboratively agreed that the international project served to develop:

- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- An ability to function in multidisciplinary teams
- An understanding of professional and ethical responsibility
- An ability to communicate effectively
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- A knowledge of contemporary issues
- An ability to use the techniques, skills, and modern engineering tools necessary to engineering practice

The project also met the ABET objective of developing homework presentation, written reporting, interpersonal interactions, and team-effectiveness skills.

Most of the American students found the exercise of outlining ABET criteria useful and understood how this experience benefited them as potential engineers. They felt as though they learned more about the goals of the project after it was completed. In order to improve the outcome of this project in future classes, it may be appropriate to discuss the ABET requirements and how the project can help fulfill them before the project occurs. This would help the students understand why they are undertaking the project and may help them benefit more from it. Additionally, it would also be very positive if the instructions and simulation information were given to all the students at least a week prior to the teleconference. This would allow the students more time to consider all possibilities and to discuss with their fellow classmates in their group before talking with their peers overseas. So, in essence, it would help the students have a better idea of what they would be required to do so they could use their teleconference time more effectively.

In order to increase satisfaction with international communication efforts, more teleconferences could be scheduled for students. According to the results of the surveys, students would have liked to have more moments of face-to-face interaction, especially in the initial stages of the simulation while planning all the work to be done. This may have helped the students to establish more effective communication. When students used this technology for the first time, they were not familiar with it, making the interactions between the Americans and Spaniards rather awkward at times. A second teleconference would have allowed the participants to learn from the mistakes made in their first interaction through videoconferencing and to organize work in a more efficient way. Looking at the project from the Spanish students' point of view, more than one teleconference would be beneficial since it would help them work on their oral English.

Another suggested change to make to this project if it is implemented in the future is to divide the students into groups in terms of participants' schedule compatibility for both the teleconference and for subsequent collaborations. This measure is very likely to lead to effective work among the group members. Also, from the results obtained it appears it would be a good idea if the project was spread over a longer period –at least another week. This would help the students have more time to communicate with their international partners as well as providing extra opportunities to work on the projects. It appeared to the researcher that the students had to rush. However, this behavior may have been due to the project being held at a busy time in the semester.

The simulation has shown that international collaboration is much more complex than simply overcoming geographic and language barriers. Cultural differences will always play a role in how an international group completes a project. Because of these inherent issues, it is imperative that students be introduced to international collaboration so to avoid and learn from mistakes made in a hypothetical –rather than a real– project. Ultimately, this project is very likely to help students prepare for intercultural work that they may one day encounter as professionals. What is more, it could be recognized as an excellent vehicle for the development of a combination of extremely important and useful "soft skills." If students are aware of the importance of a well-rounded curriculum, encompassing more than just solving problems from their textbook, then if they are placed in a transnational project with colleagues who speak another language, "they may begin to develop the skills provided by an opportunity to work with colleagues on an intercultural project, one that is similar to the type of work that they are increasingly likely to encounter in their professional lives" (Halleck & Coll-Garcia, 2011, p. 9).

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KEY TERMS AND DEFINITIONS

ABET Criteria: The Accreditation Board for Engineering and Technology is a non-governmental organization that sets criteria for accrediting engineering, technology, and computer science programs. It specifies minimum curricula and it establishes a set of student outcomes.

Collaborative Learning: Cooperative arrangement in which learners of different abilities and interests work jointly in small groups to complete a project or solve a problem.

Critical Thinking: Refers to the ability to analyze information objectively and make a reasoned judgment. It involves the evaluation of sources, such as data, facts, observable phenomena, and research findings.

Four-skill ESL/EFL Classes: Classes in with English as a second or foreign language is taught thorough the development of the four communicative skills, namely listening, speaking, reading and writing.

Intercultural Competence: Ability to develop targeted knowledge, skills and attitudes that lead to visible behavior and communication that are both effective and appropriate in intercultural interactions.

Simulation: Language learning model which allows students to express themselves to their peers in a group setting. Students take on specific roles and they are given a task which may last a single period or stretch over a number of sessions. At the end of the exercise the group will have arrived at some decision which they will be expected to justify.

"Soft skills": Combination of people skills, social skills, communication skills, personality traits, attitudes, career attributes, social intelligence and emotional intelligence quotients, among others, that enable people to navigate their environment, work well with others, perform well, and achieve their goals.

APPENDIX 1

Full International Project Instructions for the International Online Pilot Study (i.e., American Students Collaborating With Spanish Students)

Engineers Without Borders International Project

As part of our class this semester, you will be working with engineering students from Universitat Jaume I. Castellón in Spain. Three American students and three Spanish students will be working together to plan a humanitarian mission for the organization Engineers Without Borders. As part of your planning, each group will need to choose the best project from the list provided, select a project leader and send him an invitation letter, request funds, and advertise your project to other engineering students. For all the steps, you should collaborate with your partners in Spain and turn in one final draft for all six members.

Since we obviously don't have time to ACTUALLY go to any of these locations this semester, the project will be a classroom "simulation." During the two weeks that we conduct the simulation, you should try to think, speak, and act like you are truly planning this trip. Try to make your documents and your conversations with your partners as realistic as possible. Consider the factors that you would be faced with in the real world; anticipated costs, communication problems, possible setbacks, even mosquitoes.

Project Instructions

Week 1

Step 1. Meet with International Partners.

The first step in this process is to meet with your international partners through a face-to-face teleconference. Times have been arranged for each group to meet based on the schedules you gave to us. During your teleconference you should try to introduce yourselves, establish a basic schedule for meeting and working on documents, and if possible, begin discussing the projects you prefer. Times for each group are listed below. All teleconferences will last about 20 minutes and are held in ITLE (Institute for Teaching and Learning Excellence) Room 141.

After you have met and worked out a few details, you can continue to keep in touch through your *Google-Sites* group. Each group has a *Google-Sites* virtual space already set up. You will be invited to it through the email you provided. To access your group site, you must first set up a Gmail account at www.google.com.

Through *Google Sites*, you can post documents, post messages on the message board for your partners to read later or have a live chat with one or several of your group members. Use this site to make decisions and collaborate on your project documents. To access the chat feature, click on the page that says "Chat" and follow the instructions on that page. Remember that you can only chat with your partners when they are online and logged in, so you will need to arrange specific times to chat with your partners during your first meeting or later through the discussion board.

Step 2. Choose 3 projects from the "List of Projects" provided in your packet.

Look over the details of all the projects. Which are the most feasible? Which do you think will benefit people the most? Which match best with your group's skills and interests? Choose the three best projects from the list.

Step 3. Review the "Project Leader Resumes".

Consider the type of leader you will want for your three projects. What types of experience, skills, and knowledge would this person need to have? Then review the résumés of the potential project leaders. Try to match your projects with project leaders that might be compatible.

Think through what skills will be needed on each project. What kind of engineering will be involved with them? What size of team will it require? What special skills should its leader possess? Look at each resume to find candidates who might match well with that project.

If you are going to need a large team of volunteers, you might want a project leader with managerial experience. If you will need special equipment, you might check the other skills to see if your manager is familiar with how to operate it. If you needed to purify water, would your manager know what chemicals were needed? Look over their educational background to see what their knowledge base is and how it might apply to your project.

Step 4. Choose your project and complete the "Project Plan Form".

Out of your three projects and the list of project leaders, choose just ONE project and ONE project leader to run it. As you choose, consider the problem carefully. Even if a project would be the most beneficial to the community, it cannot benefit anyone if it fails. Pick a project that is feasible and that you feel is beneficial. Make sure you can find a project leader that you think could help your project succeed.

Choose just one project from your three possibilities. Work together as a group to complete the "Project Plan Form" where you explain the reasons behind your decisions.

Week 2

Step 5. Write a "Letter of Invitation" to the potential project leader.

Once you have chosen your project leader, you should write a letter to him/her in which you ask him/her to run your project. In the letter, explain why you chose him/her and how you think he/she can help your project. Also include a brief overview of the project along with its expected benefits to the community and any possible challenges it might face. Remember that this letter must PERSUADE the project leader to join in your project.

Prepare it in standard letter format in a 12-point Times-New-Roman font, double spaced. The letter should be about 1-2 pages.

Step 6. Choose a group to fund your project from the "Sources of Funding" list and write a "Request for Funding".

Look over the list of Sources of Funding. Decide which mission statement best matches the goals and benefits of your own project. Write a letter to the organization asking for the funds to complete your project. Include an overview of the project in which you explain how the funds will be used –i.e., materials, labor, research, equipment, etc. Make sure to explain how investing in your project matches the goals of the organization.

Prepare it in standard letter format in a 12-point Times-New-Roman font, double spaced. The letter should be about 1-2 pages.

Step 7. Write a "Student Advertisement" to recruit student engineers to work on your project.

Prepare a 1-page flyer in which you recruit student engineers to work on the project. This should be something that a professor could pass out in class or that you could post on a bulletin board. Look around campus at other flyers for ideas. Consider using images, font sizes, and spacing to make your flyer easy to read and visually appealing.

Make sure to consider what information will be most important to them when reading and what will be most enticing about the project for a prospective volunteer. What are the most important factors for a student engineer? What are the benefits of this project?

Step 8. Compile chat records of your group.

A portion of your grade for this project is your communication with your other group members. Your teleconferences will be video-taped, and your instructor can get on your website to look at the posts on the discussion board. You only need to provide the records of your conversations in the chat program.

To get these records go to your Gmail homepage at http://mail.google.com. Click on the "chat" icon in the menu on the left. Open each of the chats between you and your group members and paste them into the correct place in your Project Packet Template. Make sure and include all the chats that took place between any group members. MAKE SURE TO INCLUDE THE NAMES, DATES, AND TIMES OF YOUR CHAT.

Step 9. Submit the Project Packet.

Turn in one version of the final packet in class on Friday March 6th. Use the Project Packet Template and place your individual documents in the correct place.

Project Packet Checklist

- Letter of Invitation
- Request for Funding
- Student Advertisement
- Chat Records

APPENDIX 2

Project Plan Form

Group Members

Name:_ ________________________ Name: _________________________
Name: _________________________ Name: _________________________
Name: _________________________ Name: _________________________

Instructions: Complete the following form based on your group discussions during the first week of the simulation. You should complete one final version for your entire group and submit it to the ASSIGNMENTS page on your GoogleSite Friday February 27th. Each answer should be about 1-2 paragraphs.

First Choice Project Location

1: What were your reasons for choosing this project?
2: Provide an overview of the project from start to finish.
3: What branches of engineering will this project require – i.e. civil, chemical, etc.?
4: How many crew members will the project require?
5: How long will the project take?
6: What costs do you anticipate?
7: What type of equipment or materials will this project require?
8: What obstacles do you anticipate?
9: What benefits do you believe this project will have for the community?

Second Choice Project Location

10: Why did you want to plan this project?
11: What were your reasons for deciding against this project?

Third Choice Project Location

12: Why did you want to plan this project?
13: What were your reasons for deciding against this project?

Desired Project Leader

14: What were your reasons for picking this leader?
15: What parts of his or her experience were most important to you in choosing? Why?

Chapter 10

First-Year Japanese Learners' Perceptions of Computerised vs. Face-to-Face Oral Testing:
Challenges and Implications

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ABSTRACT

This chapter explores the effectiveness of computerised oral testing on Japanese learners' test experiences and associated affective factors in a Japanese program at the Australian tertiary level. The study investigates (1) Japanese beginners' attitudes towards the feasibility of utilising a computer-generated program vs. a tutor-fronted oral interview to assess their oral proficiency, and (2) the challenges and implications of computerised oral testing vis-à-vis Japanese beginners. It presents the initial findings of the qualitatively analysed data collected from student responses to open-ended survey questions and follow-up semi-structured interviews. A thematic analysis approach was employed to examine student perceptions of the two different test settings and their effects on students' oral performance in relation to test anxiety. Despite the fact that computerised oral testing was overall perceived to be beneficial for streamlining the test process and reducing learners' test anxiety, the findings also identified its limitations.

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BACKGROUND

In current foreign language oral testing and assessment, the conventional face-to-face interview-based testing format is commonly adopted (Chalhoub-Deville, 2001; Galaczi, 2010). These oral proficiency interview tests require the presence of an interviewer, who functions as an interlocutor in a pseudo-conversation and simultaneously assesses students' oral productions at the levels of vocabulary, grammar, pronunciation and pragmatics (Amengual-Pizarro & Garcia-Laborda, 2017; Zhou, 2015). Experienced oral examiners are also attuned to the interviewees' sociocultural/linguistic backgrounds in order to adjust interviewing approaches, while monitoring students' command of the intonation, pacing and nonverbal cues during the oral proficiency interview (Larson, 2000; Norris, 2001).

Interviewer-initiated tests also face concerns regarding the validity of assessing students' test performances (Alderson & Banerjee, 2002; Bachman, 2000; Chapelle & Douglas, 2006; Galaczi, 2010; Winke & Fei, 2008), and the substantial amount of teacher time required for test delivery and evaluation of the test outcomes (Amengual-Pizarro & Garcia-Laborda, 2017; Zhou, 2015). On the other hand, "Computer technology has been especially productive in the area of language testing" (Pizarro & Laborda, 2017, p. 24), especially when it comes to its administration and delivery. Availing itself of the standardised format and self-directed setting, computerised oral testing may serve as an alternative to potentially mitigate these limitations faced by its examiner-led, interview-based counterpart (Chapelle & Douglas, 2006; Douglas & Hegelheimer, 2007; Jamieson, 2005; Pizarro & Laborda, 2017; Suvorov & Hegelheimer, 2014). That said, research targeting this area, especially with respect to Japanese oral testing and assessment in Australia, is still a less charted territory.

This project was initiated in order to produce the first computerised Japanese oral testing program. Having focused on the innovative use of digital technologies, this study investigated the effectiveness of computerised oral testing conducted in a tertiary Japanese program and its impact on students' test experiences and perceived attitudes. Specifically, it aimed to explore (1) Japanese beginners' beliefs in the feasibility of a computer-generated program vs. a tutor-fronted interview utilised to assess their oral proficiency, and (2) the challenges and best practices of utilising computerised oral testing in a first-year Japanese unit. This chapter presents the initial findings from the qualitative data collected from students' responses to open-ended survey questions, followed by semi-structured interviews. A thematic analysis approach was employed to examine the students' perceptions of the two different oral test settings. This chapter explores the aspects identified in terms of the first launch of computerised oral testing, which leads to the implications for pedagogical approaches focusing on languages other than English (LOTE) oral testing and assessment.

A BRIEF OVERVIEW OF THE LITERATURE

Oral assessment is commonly used to test learners' speaking skills in a target language as it provides an avenue for teachers to evaluate students' command of oral communicative competence and proficiency (Garbati & Mady, 2015; Larson, 2000; Nazara, 2011). The conventional test format requires students to demonstrate their oral performance in the form of a face-to-face interview, a skit or an oral presentation and has been a predominant form of oral assessment in LOTE (Dohl, 2012). However, this format places heavy demands on the oral examiner to multitask, such as questioning/responding to each examinee, recording their oral outputs for further evaluation, checking their reactions to the oral prompts, and assessing their oral performances as a whole. As such, one-on-one, interviewer-led oral testing lacks practicality and time-efficiency if conducted on a larger scale (Fan & Ji, 2014; Kenyon & Malabonga, 2001; Zhou, 2015).

Research has also suggested that test takers' characteristics and attitudes may negatively affect their actual test performances (Bachman, 1990, 2000; Bachman & Palmer, 1996; Fan & Ji, 2014; Gu, 2011), with test anxiety rated as one of the most pronounced factors (Norris, 2001; Onwuegbuzie, Bailey, & Daley, 1999; Pizarro & Laborda, 2017). For example, there are some language learners who often feel anxious when speaking in front of an oral examiner, which results in their poor oral performance (Dohl, 2012; Fan & Ji, 2014; Kessler, 2010; Zhao & Cheng, 2010). Horwitz, Horwitz and Cope's (1986) seminal piece defined foreign language anxiety ". . . as a distinct complex of self-perceptions, beliefs, feelings and behaviors related to the classroom language learning arising from the uniqueness of the language learning process" (p. 128). They developed a Foreign Language Anxiety Scale to measure the effects of foreign language anxiety on learners' performance, attributing three key components to learner anxiety: communication apprehension, fear of negative evaluation by others, and test anxiety. This affective factor, test anxiety, is worth noting as it directly impacts students' oral performances in high-stakes testing (Dohl, 2012) and leads to negative test washback, such as lowered self-esteem (Alderson & Banerjee, 2002; Zhao & Cheng, 2010).

The trend of the widespread application of technologies has also transformed the delivery of language testing and assessment (Bahadorfar & Omidvar, 2014; Chapelle & Douglas, 2006; Douglas & Hegelheimer, 2007; Godwin-Jones, 2001; Jamieson, 2005; Norris, 2001). Computer-aided testing has been shown to foster learners' positive test experiences, thanks to its affordances in time-efficiency, convenience, and face validity in fair assessment (Galaczi, 2010; Pizarro & Laborda, 2017; Suvorov & Hegelheimer, 2014). According to Zhou (2015), computerised oral testing brings benefits to not only teaching staff (e.g., uniformity in test delivery and cost-effectiveness), but also students by lowering their uneasiness when the oral examiner is not present during their oral performance. Hence, the practicality, standardised item delivery and self-directedness without the influence of an interviewer enhance the test validity and reliability in computerised oral testing (Chapelle & Douglas, 2006; Dohl, 2012; Douglas & Hegelheimer, 2007; Kessler, 2010; Larson, 2000; Zhao & Cheng, 2010). Conversely, one-on-one, examiner-fronted oral testing grapples with the issue of test validity and reliability when the human bias and inconsistency in item delivery come into play (Alderson & Banerjee, 2002; Bachman, 1990, 2000; Galaczi, 2010; Winke & Fei, 2008).

As the workloads of academics in Australian tertiary institutions are growing heavier (Ryan, Tynan, & Lamont-Mills, 2014), a computer assisted testing format could provide an alternative to streamlining various types of testing procedure, particularly targeting oral testing in LOTE. Despite the positive aspects of computerised oral testing identified in previous studies, there are still questions regarding its feasibility and the extent to which students' spontaneous communicative skills with interlocutors can be measured appropriately by automated technology. For example, oral test assessors evaluate not only the accuracy of the students' language outputs, such as sentence structure and grammar, but also how they demonstrate communicative competence in the target language during spontaneous interaction with the assessors, such as using expressions in appropriate contents or strategy use to resolve communication breakdown (Amengual-Pizarro & Garcia-Laborda, 2017; Kramsch, 1986; May, 2009; Norris, 2011). The latter of these, however, poses challenges to computerised oral testing as the current development of automated technology still falls short of measuring the levels of discourse and strategic competence demonstrated in authentic and unrehearsed oral outputs.

Prior studies on LOTE oral testing have predominantly targeted language educators' perspectives and observations, as reviewed in the above literature. The question raised here is how LOTE students, beginners in particular, feel about the impact of both computerised and face-to-face oral testing on their oral test performance and test experience. Hence this study was conducted to better understand the usefulness and pitfalls of computerised oral testing as an alternative to its face-to-face counterpart, while identifying its advantages and challenges in actual implementation. Specifically, it focused on the experiences of Japanese language beginners with the two different test modes and their perceptions of the impact of both modes on their test performances. Findings drawn from this study provide insights into the effectiveness and feasibility of computerised oral testing in Japanese, an under-researched area in the Australian tertiary context.

RESEARCH METHODOLOGY

Setting and Participants

Among the different levels of Japanese language units offered at Australian tertiary institutions, the first-year Japanese language units tend to attract a large number of students. The institution targeted in this study offers two Japanese beginner units in the first-year course. Both continue for the whole academic year. The first unit (Japanese Unit 1) in semester one caters to complete beginner learners without any prior learning experience or knowledge of Japanese, whereas the second unit (Japanese Unit 2) in the subsequent semester is offered for students who have learned and mastered Hiragana, Katakana and at least 28 basic Kanji covered in the first unit. The second unit was the focus of this study, as students at this level are able to start using simple vocabulary and structure to communicate in Japanese.

Japanese Unit 2 usually attracts approximately 70 undergraduate students across varied disciplines. Most of these students take this unit as their major course to fulfil the degree course requirement in Bachelor of Arts, Commerce, Science or Education. Students enrolled in this unit are required to complete three assessment tasks: a mid-semester test, an oral test and the end-of-semester examination. Unlike the two written assessments conducted within a short test duration (i.e., two hours), the oral test is more time-consuming for the test conductor in a one-on-one, tutor-led interview style. While the test time only lasts for 10-15 minutes for each student, it takes around 12 hours of the tutor's time to complete the whole oral test in order to accommodate all of the students scheduled in intensive time slots throughout the examination week. Due to the increasing number of students enrolled in Japanese Unit 1 and 2, the limited number of teaching/administrative staff were no longer in a position to cope with the high demand. As such, an alternative to the labour-intensive, face-to-face oral interview format was urgently needed.

Development of Computerised Oral Testing

The implementation of this project commenced in semester two, 2018, when the Japanese beginners' oral proficiency was assessed as part of their Japanese Unit 2 assignments. As well as the traditional face-to-face interview style oral test, a computerised program for oral Japanese assessment was developed and launched to run side-by-side with its face-to-face counterpart in the target institution of this study.

To ensure successful implementation, the following steps were acted upon: screening oral questions to be stored in the item pool, setting up the computerised program, piloting the usefulness of the developed program, and addressing ethics considerations. To illustrate, the content of the oral questions corresponded to the lecture topics covered in the class, such as shopping, dining in a restaurant, family, seasons and weather. Question types included (1) Q&A interviewing (answering factual questions, for example, Japanese prices, numbers, days of a month); (2) opinion seeking (expressing opinions about familiar topics, for example, favourite activities, past experiences, politeness in greeting), and (3) visual stimuli (describing physical referents displayed in pictures, for example, body features or clothing a person is wearing). The Japanese course coordinator, who is also one of the researchers, collaborated with the Japanese Unit 2 tutor to screen all the potential questions in preparation for the program development.

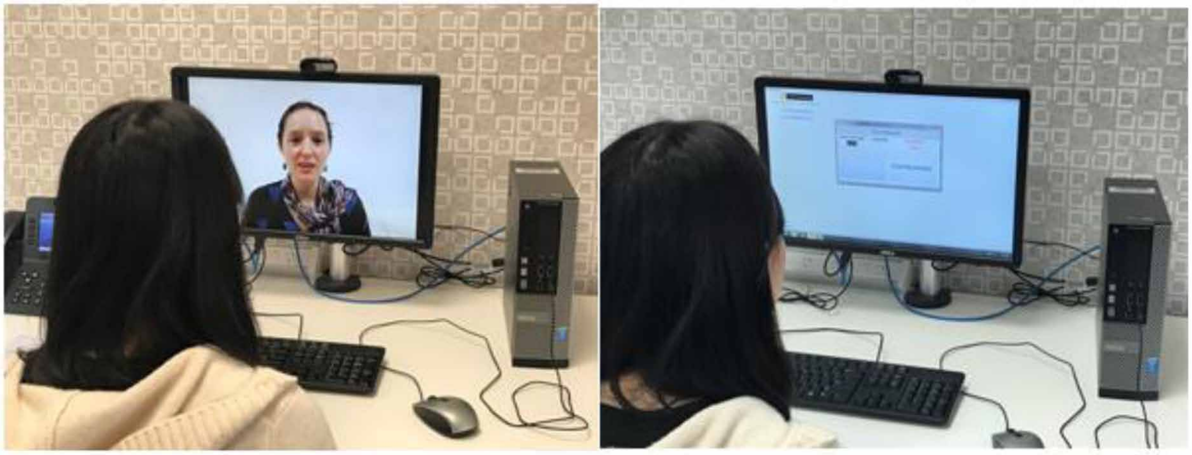
Working with a computer programmer, the research team created the first computerised Japanese oral testing program after the question item pool was finalised. This program could be configured in any desktop computer via the institution's secured authentication. One of its salient features was that the system allowed question items to be assigned randomly to each test-taker in order to mitigate practice effects. The tutor also video recorded each monologic oral question as if she were speaking to the students in a face-to-face, oral interview setting, which aimed to enhance face validity that offered familiarity and connection between test format and item (Mackey & Grass, 2016).

A pilot was also conducted in which the tutor invited five former students of Japanese Unit 2 to try out the program and share their views about their experiences of computerised oral testing. Their input was fed back into further program improvement (e.g., navigation, interface and user-friendliness) and item modification (e.g., removal of items that were too difficult or vague). Ethics clearance was approved by the university's Human Research Ethics Committee and consent was obtained from students enrolled in the Japanese Unit 2, 2018 before the commencement of the official oral test. The students in the treatment group (see below) were assured that they could withdraw at any time before the test and opt for the traditional face-to-face oral interview without marking penalty.

Data Collection

A total of 46 students in Japanese Unit 2 were assigned randomly by drawing lots to two groups for oral testing. The comparison group consisted of 25 students using the one-on-one, tutor-led interview style and the treatment group consisted of 21 students using the newly developed computerised program. There were some students in both groups who had experience in learning Japanese in high school and had undergone an oral test. However, this was their very first oral test in Japanese at university level. Both groups were informed of the purpose of the study, and that the oral questions, the response time (30 seconds) and the test duration (16 minutes) were kept the same for each testing mode. The actual implementation of the computerised oral test was further explained to each student as follows: (1) the computerised program was installed in each computer of the oral test venues; (2) each student was required to log in first, following a sample question displayed on the screen for students to practice the test features and audio recording their responses; (3) audio recordings could be played back for students to check the volume; and (4) all the audio recordings were saved in the program for further marking and data analysis. Hence, the only difference between computerized and face-to-face oral test settings was that the treatment group responded to questions displayed in the computer-based program (see Figure 1), whereas the comparison group answered the questions asked by their tutor (as the oral examiner) in person. The quantitative data analysis, comparing the oral performances of both groups, is not the main purpose of this chapter. Exploratory in nature, this qualitative study reports on the voices of learners of Japanese at a tertiary education institution regarding their oral test experiences with and views about the two different settings.

Figure 1. The tutor's video recorded oral prompt (left) and the program interface (right)



A survey, comprising 26 five-point Likert-scale items ranging from strongly agree to strongly disagree and six open-ended items, was administered immediately after each student completed their oral tests using either the computer-programmed testing mode (CP henceforth) or the face-to-face mode (FTF henceforth). As indicated above, only the qualitative data drawn from the open-ended questions are reported here. To keep the item consistency, those questions were phrased the same with the only difference in the testing format in each group (see Table 1).

Table 1. Open-ended survey questions for both groups

Q1	**CP**	What are the possible advantages of a computerised oral testing program for assessment?
	FTF	What are the possible advantages of face-to-face interviews with a tutor for assessment?
Q2	**CP**	What are the possible drawbacks of a computerised oral testing program for assessment?
	FTF	What are the possible drawbacks of face-to-face interviews with a tutor for assessment?
Q3	**CP**	Did you feel more engaged when using the computer oral testing program? Why or why not?
	FTF	Did you feel more engaged when being interviewed face-to-face by a tutor? Why or why not?
Q4	**CP**	How did you feel about responding to video and audio prompts for oral testing, versus being interviewed by a tutor?
	FTF	How did you feel about being interviewed by a tutor for your oral testing?
Q5	**CP**	How did you find using the computerised oral testing program helped your overall performance?
	FTF	How did you find using the tutor-fronted oral testing helped your overall performance? Please explain.
Q6	**CP**	Do you have any suggestions or comments about the computerised oral testing program that may improve the program and benefit future students?
	FTF	Do you have any suggestions or comments about the tutor-fronted oral testing that can benefit future students?

A follow-up semi-structured interview was conducted to better understand the students' responses to the survey questions and clarify certain ambiguous areas. It also helped to confirm (or disconfirm) the researchers' initial interpretations of the survey data. Although several students indicated in the survey responses that they were willing to be contacted for a follow-up interview, only two (one from CP and the other from FTF) were available to share their insights about the two different oral testing modes. Interviews were recorded and transcribed for further data analysis.

Data Analysis

To gain a fuller picture of the investigated phenomenon, a thematic data analysis was employed. Each researcher iteratively read through the qualitative data comprising the open-ended survey item responses gathered from both groups and semi-structured interview transcripts in order to get a general understanding of the data set as a whole. The research team conducted their own coding and then met to compare these codes while discussing their initial interpretations and resolving the coding differences. The research team then reached a consensus on higher-level thematic categories supported by salient patterns repeatedly occurring the data set (Merriam & Tisdell, 2016).

RESULTS

This section reports on findings addressing the two research aims (1) to examine the Japanese beginners' experiences with computerised (CP) vs. face-to-face (FTF) oral testing and their impacts on students' oral performance; and (2) to identify the challenges and best practices of utilising a CP program in a first-year Japanese unit in order to provide evidence-based recommendations for research and practice. Two key themes are categorised (i.e., the *affective* and *test implementation* aspects) and the pros and cons of each testing format are discussed, supported by the corresponding qualitative data. Tables 2 and 3 below present thematic patterns relating to each aspect.

Table 2. Affective aspect

	Positive	Negative
CP	• Anxiety reduced when the tutor is not present. • Less embarrassed at making mistakes without being watched.	• Lack of face validity in an unconventional testing environment. • Technological discomfort due to unfamiliarity with the system features and navigation.
FTF	• Familiarity with the tutor easing students into the test. • More personalised in a natural setting.	• Losing face: pressure increased when making mistakes in front of the tutor.

As the CP was set up in four quiet rooms equipped with desktop computers, students were able to take the test privately and simultaneously. The responses from the post-test survey revealed that most students felt comfortable and relaxed in a secluded setting: ". . . I felt at ease speaking to myself in a room," and "The program made me feel less nervous, and I like how each student had their own private rooms." The results suggested that the CP test setting was psychologically beneficial for the Japanese beginners. They were free from continuously gauging how their performances were perceived by the tutor as their examiner, and were able to concentrate solely on the test itself. This aspect mirrors the affective concept of face saving (or losing), especially in a situation where students inevitably had to face a tutor with whom they had already established a bond over the semester. The CP served as a *psychological buffer* against the affective factors. With the tutor's absence, students were able to feel more at ease with their own performances during the test as evidenced in "I felt the test was easier as I was just talking to myself and felt less anxious when speaking" (Student Survey). The removal of the tutor's presence also reduced the pressure and allowed the students to feel less embarrassed if they underperformed on the oral test, as they did not have to worry about how the tutor was looking at their performances during the oral test. For example, some said, "I felt comfortable because no one could hear me . . ." or "It induces less anxiety and students will feel more at ease taking their time and possibly less stuttering involved" (Student Survey).

Conversely, foreign language oral testing is generally conducted in a FTF oral interview style in that the tutor also plays the role as the interviewer/examiner. Students may feel more engaged in this type of setting since the tutor personally knows the students. This is evidenced by the survey responses, such as "The tutor [made] me feel at ease and I felt more comfortable with her being there." Additionally, students usually become used to speaking with their tutor face-to-face throughout the semester, ". . . because that's who you practice with in classes" (Student Survey). The tutor generally initiates the conversation using greetings as a warm-up in order to put students at ease in most FTF settings. Although CP students also had the same opportunity to practice responding to the video recorded greetings in the warm-up stage before the test officially started, having familiarity with their tutor helped ease the nervousness. As expressed by the *interviewed student from the face-to-face testing mode* (denoted as ISFTF hereafter), "Yeah, so you sort of know her so it makes it a little bit less stressful in that sort of aspect" (ISFTF).

Given their interactions with the tutor throughout the semester, students expected their tutor to have become familiar with their voices and speech styles. Hence, having the tutor's presence enabled them to perceive the FTF oral interview as more personalised and "less rushed" (Student Survey). Interestingly, the tutor's presence also became a double-edged sword as many students also felt increasing pressure due to their self-consciousness about making mistakes in front of the tutor and how their self-image could be jeopardised if perceived negatively by their tutor. Other students further elaborated that their test anxiety derived not only from the presence of their tutor but also from anyone with whom they were required to speak the target language. The fact that students were worried or anxious about disappointing their tutor or looking foolish when making mistakes affected their oral test performance, such as "[I was] slightly nervous as I didn't want to look silly if I got the questions wrong" (Student Survey). The survey data were also verified and elaborated vividly by ISFTF,

> *We've, um, been taught by [the tutor] for the whole semester. So we sort of do know her a little bit and she also sort of knows us. But, um, I guess having someone that we don't know might also be good because at least we don't have to feel like we're disappointing or anything. So sort of like an outsider perspective, I guess. But, um, yeah, so it has its good and bad aspects because like I obviously didn't want to disappoint her and make her feel . ., you know, she didn't teach us very [well], even though she did a great job. . . . So I guess it sort of makes [us] a little bit more nerve-wracking um, because you don't want to disappoint her.*

Interestingly, an ISFTF further claimed that she was "still nervous" irrespective of the testing mode (i.e., CP or FTF) due to the nature of the test itself:

It was only because, um, at first, I didn't know the answer. So, so I was like 'Oh my god.' But then I think I answered okay . . . I think I just wasn't expecting the test question but it wasn't even a hard – I think I was just overthinking everything so I was like, 'Oh my god, a test question. I mean a warm-up question.' . . . So yeah, I was just a stress-head that day.

Table 3. Test implementation aspect

	Positive	Negative
CP	• Time saving and more streamlined. • Consistency in item delivery and format. • Autonomy: allowing students to control their own pace.	• Technological difficulties affecting test performance. • Absence of an interlocutor in a natural setting. • Lack of back-channelling expressions to serve as paralinguistic prompts.
FTF	• Face validity: test conducted in a familiar conversation format. • Presence of nonverbal cues facilitating communication.	• Labour intensive and time consuming. • Difficulty in keeping consistency in item delivery over an intensive test period.

What sets the CP apart from the FTF mode is that it streamlines the oral test procedure and facilitates its delivery (Amengual-Pizarro & Garcia-Laborda, 2017; Zhou, 2015). In this case study, multiple students were required to take the test concurrently – a time-saving mechanism making it more manageable to test a large number of students, especially during a short testing window. As all the oral prompts were already pre-recorded and randomly assigned to multiple students in the same time slot, the tutor (oral examiner) only had to lead the test takers to the designated room and set up the system for them without having to sit through the whole test duration with each student. That is, different from the FTF mode requiring a tutor to interview all the students labour-intensively, or additional test assessors to co-share the heavy load, the CP mode would be relatively more cost-effective and could potentially bring in financial benefits to institutions – if reliable, reusable and user-friendly software could successfully established (Kenyon & Malabonga, 2001; Suvorov & Hegelheimer, 2014).

Given its standardised and computer-generated nature, the CP oral testing format also ensured consistency in item delivery without being impacted by the human factor (i.e., tutor bias or inconsistency in item delivery due to the intensive administration fatigue) which is usually experienced in the face-to-face format. This advantage of consistent CP test implementation benefited students in their oral test performances. To illustrate, the CP mode allowed for the five seconds of wait time before the recording started. Learners could also listen to the same question twice by clicking on the repeat button, which was also applied to the FTF group asking the tutor to repeat the same question twice for the sake of comparability. Additionally, a timer was visible on the screen for learners to keep a track of their progress. This was appreciated by several students, who made comments such as "With a timer . . . can have better time management" (Student Survey). Depending on individual performances, the students also had the option to cut short the recording time (15 seconds) whenever they were finished and proceed to the next question. However, most still waited for the automatic transition into the subsequent question. In other words, the students participating in the CP mode had the opportunity to organise and process their input during the thinking/wait time before uttering their responses, as exemplified by, "I was able to think aloud . . ", "I was in control of the pace I could record myself" or "I believe I felt more comfortable when pausing to think" (Student Survey). They also perceived the CP mode to be "more flexible and . . . more controlled" (Student Survey) than the tutor-led interview style. As such, the CP oral testing rendered the students more autonomy to take control of their own pacing in oral testing, as opposed to its FTF counterpart where students were *inherently pressured* (or *expected*) to answer each question as soon as it was asked by the tutor.

Nevertheless, negative aspects of the CP were also observed during its implementation. Since a one-on-one interview style is the conventional practice used widely for oral tests in foreign language education, most students in this study had never experienced a CP oral testing style, much less operated the system by themselves. A tutor in the FTF mode, on the other hand, could lead the conversation flow and even gauge students' nervousness. Despite the well-intentioned system development of video recording the tutor's presence to enhance familiarity, the CP still lacked lacks face validity in this sense, as ISFTF stressed:

> *Because at least you could have like an actual sort of conversation per se [in FTF]. So it did feel a little bit better to have a real person I guess because . . . at least they can sort of sense that you're feeling a bit more nervous and you're trying. So as opposed to just sort of hearing or recording [in CP] and I guess, [CP] can't really tell if they're really confident or like really nervous . . . So, yeah. I guess body language and [seeing a real person] is important. (ISFTF)*

While students usually feel nervous when taking any type of test, CP being new to them could also result in their test anxiety to a certain degree. Furthermore, unfamiliarity with the CP setting might have caused technological difficulties for some students, thus affecting their test performance. This aspect is particularly important: just because most of the current university students are confident in using technology does not mean that they are *digital natives* or *tech-savvy* by default (Goertler, 2009; Laborda & Robles, 2017; Vaidhyanathan, 2008). Despite the fact that CP students could practice the trial questions and tested the recording features at the outset, some of them still struggled to figure out how to navigate the system. For example, they were not aware that the volume of the video recorded prompts could be adjusted, which might have caused their misunderstanding of the questions such as "computer malfunctions" and "mic-recording too low and [hence] misunderstood" (Student Survey), thus leading to unwelcome repercussions: ". . . if the program screws up during the test then you're going to freak out [laughs]" (ISCP).

As the presence of an oral interviewer was not required in the CP format, this turned the oral testing into a less natural communication since a typical interview-based test generally involves at least two interlocutors. For example, some students reported that the CP mode made them ". . . [feel] less natural and sometimes harder to understand" while the FTF mode ". . . makes it more realistic and natural talking to someone face-to-face" (Student Survey). In addition, one FTF mode student personally expressed the importance of a natural conversation setting, saying "conversation feels more natural, actually has the presence of another, beneficial for conversation practice, [and] feels personal."

The absence of an interlocutor in CP also indicated a "lack of emotional response" in phatic communication; one student complained about "no real tutor reaction, not like real conversations" (Student Survey). In other words, various verbal or nonverbal signals were not available for CP students to interpret in order to facilitate the conversation flow. The former (verbal cues) includes back-channelling expressions for oral communication (e.g., I see, right, uh-huh, mm-hm), while the latter (nonverbal cues) includes body language, such as facial expressions, eye contacts and movements, and gestures. These are able to serve as additional support and useful clues to help the students decipher the meanings of the questions, as voiced by ISCP, ". . . I like to watch people's body language." These nonverbal clues rendered by interlocutors are usually perceived as vital communication devices (Hasegawa, 2015), which play a significant role, especially for lower-level learners/examinees. This aspect was echoed by several students: "Yes, the tutor's body language makes me feel more engaged in the interviews" and "Body language and facial expressions help me engage in the conversation" (Student Survey). Even a slight facial expression or gestures shown by the tutor can be viewed by the students as a green light (approval) clearing uncertainties about their initial responses or a red light (qualm) prompting them to refine their responses.

In order to ensure fairness and consistency in test delivery, as in the CP group, the FTF counterpart did not receive as many verbal/nonverbal cues from their tutor as they had expected. Learners perceived this negatively, highlighting the vital role that paralinguistic clues play in oral communication and the impact of the removal of these clues, such as facial expressions, on students' test experiences. As ISFTF explained:

. . . like facial expressions which she was very good at sort of keeping it a good monotone – like a poker face. But yeah, facial expressions or at least, like, some kind of communication, human communication . . . definitely at least like a human presence is usually quite good because it does feel like – because I guess if you're learning a different language, it is good to have a one-on-one or face-to-face conversation. But again, that wasn't a conversation. (ISFTF)

Regardless, the presence of another person in the FTF oral interview setting reinforced the face validity as it enabled the students to speak the target language with an interlocutor, which is deemed as natural in a day-to-day conversation scenario. Also it can help to boost students' engagement with the oral test, premising it as a conversation in a natural setting: "In the real world the use of Japanese language will be [for] conversing with real people . . .," "similar experience as if you were to speak to someone who was Japanese" and "Feel more engaged [when] having someone to talk to" (Student Survey). This view was also shared by ISFTF:

. . . it definitely was good because obviously if [we] go to Japan, if we speak to a Japanese person, it's usually face-to-face. So at least we have that as like a benefit I suppose, so getting used to speaking a foreign language to a person is good.

DISCUSSION AND IMPLICATIONS

As indicative from this study, CP is conducive to fostering students' test experiences, enhanced by a more time-efficient delivery mechanism and less cumbersome administration for oral examiners (Amengual-Pizarro & García-Laborda, 2017; García-Laborda & Martín-Monje, 2013; Kenyon & Malabonga, 2001; Larson, 2000; Zhou, 2015). Once the programming side of the computerised test is established, the CP mode can be employed as a cost-effective and sustainable testing system that can be accessible even remotely and adapted to self-assessment for students' test preparation. Furthermore, flexibility and self-directedness afforded by the CP mode also suits individual needs and learning styles of Japanese beginners (Fan & Ji, 2014; Gu, 2011), such as thinking-aloud before recording or taking control of their own test pacing. However, CP development needs to be informed by evidence-based research and supported by institutional funding, staff training, and technical assistance. This is probably why the stakeholders in current LOTE programs still embrace the conventional FTF interview approach (Chalhoub-Deville, 2001; Douglas & Hegelheimer, 2007; Galaczi, 2010).

The fact that the computer-operated system allows for randomised assignment of oral prompts regardless of the test takers also avoids practice effects and human bias, and enhances test validity (Douglas & Hegelheimer, 2007; Pizarro & Laborda, 2017; Suvorov & Hegelheimer, 2014). Conventional interviewer-initiated oral testing, however, has given rise to concerns about the validity and reliability in assessing students' test performances (Alderson & Banerjee, 2002; Bachman, 1990, 2000; Bachman & Palmer, 1996; Galaczi, 2010; Winke & Fei, 2008). Also noted in this study, the FTF testing mode can lead to inconsistency in item delivery, particularly during an intensive, longer test period. Specifically, the human factor (e.g., the test fatigue or boredom) in FTF oral testing makes it hard to maintain the uniformity of the test delivery—i.e., the same intonation at the same pace, timing and flow, and similar time spent on each question for each student. These test conditions place huge demands on the tutor as the oral examiner, however this can be mitigated using the CP mode.

Additionally, the CP format having the tutor's presence could avoid biased oral assessment. That is, audio recorded students' performances can be played and assessed ad hoc without being influenced by the impression of student performance during the FTF test (Pizarro & Laborda, 2017). Although the FTF format allows the tutor to be more in control and the students' oral responses to be audio recorded, the tutor may have already established an impression of each student's performance whilst conducting the oral test. This could lead to potential bias sneaking influencing his/her evaluation of students' performances, such as "As they [students] are someone you know, they [tutors] may be already influenced before the test (bias)" (Student Survey). Therefore, CP testing can safeguard fairer assessment and help mitigate the tutor's pre-conceived bias of student performance, thus enhancing positive test washback (Fan & Ji, 2014).

In fact, the current FTF test did not require much of students' spontaneous responses to referential questions as in unrehearsed communication (Kenyon & Malabonga, 2001). Given their beginner level, FTF oral testing focused mainly on the mechanical Q&A format and whether the students could answer displayed questions to demonstrate their understanding of content materials or memorised phrases covered in Japanese Unit 2. Despite the rehearsed manner, the students still found the FTF mode more natural, as in ". . . I mean you're practicing to talk to people. So, I guess, like, it would be beneficial [to talk to someone in the test]" (ISCP). Hence, the removal of paralinguistic clues might have affected their oral test performance as indicated in the CP group interview. To retain comparability and reliability in item delivery between the two test modes, the students in the FTF group did not receive as many paralinguistic signals from their tutor, either. For example, ISFTF recalled that "I guess we didn't really get too much [from the tutor] because you know, we couldn't have any responses or ask questions back. So that was fair enough." Notably, body language (i.e., facial expressions) indispensable for communication, was deemed by the Japanese beginners as useful hints to decipher the tutor's intent and help them decide whether their oral outputs were accurate (a smile) or not (a frown). One student highlighted this by saying, "I felt more engaged as I had to 'include' the tutor in the conversation, using eye contact and appropriate body language" (ISFTF). This paralinguistic mechanism serves as vital support for LOTE beginners (Pizarro & Laborda, 2017) as it cues students to stay focused, fine-tune oral output, and even build confidence when a sign of approval is received (e.g., head nodding): "Body language and facial expressions help me engage in the conversation" (ISFTF).

Another salient aspect that deserves more research attention and pedagogical consideration is learners' test anxiety (Horwitz et al., 1986; Norris, 2001; Onwuegbuzie et al., 1999; Pizarro & Laborda, 2017). Some students associated their anxiety with the test itself (Zhao & Cheng, 2010), irrespective of the test mode: "I was still nervous about the oral test" and ". . . there was a great deal of anxiety due to the nature of an oral test" (Student Survey). Interestingly, the sense of nervousness was expressed more by the FTF group than its CP counterpart due to concerns about their self-image being jeopardised by performing poorly or making mistakes in front of the tutor. This affective factor draws attention to the face-keeping aspect as explained vividly by ISFTF, ". . . you definitely feel the nerves of like having another person in your presence that you either don't know or you sort of do and you're feeling like, you know, you have to say the right thing or you'll be judged . . .".

As most students had never experienced CP oral testing before this study, their unfamiliarity with its interface, features and navigation negatively impacted their perceived attitudes towards CP. They also voiced concerns the PC camera directly facing them made them feel uncomfortable or awkward: ". . . the camera made me more stressed ... " (Student Survey). Although the PC camera attached to the computer used for this oral test was not linked to the oral test itself (as only audio recording was needed), this CP setting, venue and computer-based audio recording system caused their perceived test anxiety. Therefore, enhancing their technological familiarity may have lowered the levels of unease and anxiety in a CP environment, thus making a difference in their test experiences (Fan & Ji, 2014; Laborda & Robles, 2017). Additionally, the CP format can potentially be developed into self-assessment for students to practice at home or remotely without the constraints of cumbersome FTF test scheduling:

I think, as long as the [CP] program runs smoothly, then, it's fine, and I think it's a lot easier for students to study for and practice. Because, um, a lot of the anxiety comes from, like, being in a sort of different environment. And, um, it's a lot easier to sit at home and practice talking to your computer screen, rather than to get [an examiner] in…because, you know, schedules and stuff you can't really always get someone to be there and test you. (ISCP)

Hence, it is suggested that an induction session be put in place to orient students to the CP setting and logistics—such as the whole test duration (16 minutes), the length of time required to answer each question (15 seconds), the thinking/wait time (5 seconds) before recording, and the function of having each question repeated twice—so that their discomfort with the technology and unfamiliarity could be eased (Pizarro & Laborda, 2017). It is also crucial that students leverage the trial questions to practice their oral responses while testing the audio recording device—knowing that they can control their own test pacing.

CONCLUSION

Taken together, the negative aspects observed in the CP implementation can be construed as valuable lessons to avoid pitfalls in future oral testing implementation. Given its potential to streamline oral testing and foster beginners' test experience, the findings of this study suggest that the utilisation of computerised oral testing deserves further investigation in LOTE education. As is the case with FTF oral testing, CP development and implementation should also be tailored to the learning needs and styles of the students (e.g., trial activities), making necessary adjustments through piloting and user evaluation. Equally important is the realisation that, just because students are born in the digital age, does not make them de facto tech-savvy. Hence, familiarity with the CP functions and setting may alleviate their technological discomfort and test anxiety, as encountered in this study.

Another insightful aspect emerging from the findings is the link between the role of body language and Japanese learners' oral performance and test experiences. While the CP mode can enhance the test validity and reliability by minimising the tutor bias, the absence of these signals (i.e., tutor's nonverbal cues) has been perceived by the students as one of the major drawbacks in CP oral testing. LOTE learners, especially beginners, tend to resort to these nonverbal cues as additional paralinguistic support to gauge their responses in oral testing by either seeking confirmations from the oral examiner (e.g., a head nod) or fine-tuning outputs if not well received (e.g., an eyebrow raised). How to incorporate these features to enhance the face validity in future improvement of CP oral testing warrants further investigation (Suvorov & Hegelheimer, 2014).

Several research limitations were also identified in this study. First, despite the fact that students' responses were only audio recorded and not video recorded for data collection, a webcam was still attached to the desktop computer in each oral testing room, which seemingly caused students' unease. Additionally, the students' group selection should have been carried out more systematically and thoughtfully. Due to the fact that each group only took the oral test in either CP or FTF mode, rather than both, asking each student to compare both modes might not be appropriate for the research design. Alternatively, a longitudinal study could be conducted to counterbalance each mode so that students can experience both CP and FTF formats in order provide their perspectives in test comparison. While the students were assigned randomly into either the CP or FTF group, they should have been asked about their previous Japanese oral testing experience in the survey so that interpreting their responses could have been done more accurately in the findings. Furthermore, multiple students from each target group should have been asked to participate in follow-up interviews in order to obtain more varied perspectives in details. In addition, some of the survey items could have been phrased more carefully or piloted and screened by an external scholar specializing in language testing/assessment to avoid ambiguity, based on the assumption that wording/phrasing in the survey might have affected students' understanding of particular items. For example, instead of already assuming the benefit of CP as being "*more engaged*" (Q3) that may have misled the students' response, the researchers may have mislead the students. Instead, the researchers could have utilized the more neutral wording "*Do you feel that this test engaged you effectively?*" These limitations could be resolved through better research design and test implementation procedures and warrants a systematic approach to CP oral test design.

Finally, the current oral test format for Japanese beginners is geared more towards assessing whether they could comprehend the question and respond in a rehearsed, memorised manner. This practice is implemented under the general assumption that students at this low level could only respond to those factual questions using their memorised input. While this view is understandable and commonly shared by Japanese tutors and coordinators, it should also be acknowledged that Japanese beginners may have the potential to handle referential questions in a more unrehearsed, spontaneous manner. This leads us to ponder, *If criteria used to evaluate performances do not differentiate on examinees' interactional abilities, it may not be necessary to use the labor-intensive face-to-face interview for the assessment, no matter how the examinees feel about the nature of the assessment. On the other hand, in instances where an evaluation of interactional competence is critical, it may be quite a while before it can be replicated with technology. (Kenyon & Malabonga, 2001, pp. 81-82)*

To prepare Japanese beginners to meet both demands, developing a performance-driven, authentic, communication-oriented, standard-based curriculum supported by innovative use of digital technologies can shed new light on the improvement of the current oral testing protocol (see Sato, Chen, & Jourdain, 2017; Sato & Chen, 2019, for details). The course coordinator, for example, can recruit additional teaching assistants or former high-achieving students to conduct regular sessions (either face-to-face or online), in order to help students practice spontaneous oral communication. Furthermore, CP could be revamped so that students have ample opportunities to regularly self-access their speaking before the official test.

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KEY TERMS AND DEFINITIONS

Computerised Oral Testing: A computer-operated formafor students to take their oral test. For this project, a group of students were required to take their Japanese oral test, using the newly developed computerised program installed in each computer at the oral test venues.

Japanese Beginners: The institution in this research offers two Japanese beginner units in the first-year course. The first unit (Japanese Unit 1) is the most basic of the Japanese unit offered in semester 1, thus catering for students without any prior learning experience or knowledge of Japanese, whereas the second unit (Japanese Unit 2) is the second stage of the Japanese course, focusing on students who have previously completed Japanese Unit 1 or equivalent study. "Japanese beginners" in this chapter refers to those enrolled in the latter unit.

LOTE: Languages Other Than English.

Oral Assessment: In current foreign language oral assessment, predominant formats are a face-to-face interview, a skit or an oral presentation. The face-to-face interview-based testing format is most commonly utilised.

Paralinguistic Clues: Suprasegmentalcues include intonation, pitch, speech rate and stress, while non-verbal (paralinguistic) cues include body language, such as hand gestures, facial expressions, eye contacts and movements.

Phatic Communication: Communication for the purpose of sociability, rather than an informative function which is to communicate information or ideas.

Chapter 11

Using a Chatbot, Replika, to Practice Writing Through Conversations in L2 English:

A Case Study

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ABSTRACT

This chapter explores university students' views of Replika, an English chatbot. Students in a department of health administration at a state university in Turkey used Replika to complete different tasks over 7 weeks. At the end of the study, semi-structured interviews were conducted with 10 randomly selected students. They liked using Replika and found the software useful. The participants underscored the importance of receiving an immediate response to what they wrote on their mobile devices and added that they edited their sentences when Replika could not understand the message they were trying to convey.

INTRODUCTION

In recent years, there has been an increase in the number of technological devices and tools that can support instruction and learning in language skills, more specifically writing (Chen, Carger, & Smith, 2017; Godwin-Jones, 2018; Rahimi & Pourshahbaz, 2019). These new technologies appear to have affected the way people write in various aspects. For example, many writers have started to learn how to write in an increasingly digital age, where many feel the need to use digital devices such as smart phones and tablets. While digital devices and software mainly aim at circumventing the physical task of writing by hand, they can also be used as an aid to teach and to assess writing in various different ways. For example, machine scoring or automatic assessment of writing (Li, Dursun, & Hegelheimer, 2017; Liou, 2016), online dictionaries and corpora that may improve content (Cotos, 2017; McEnery, Brezina, Gablasova, & Banerjee, 2019; Navarre, 2019; Reppen, 2010) and proofreading tools for self-editing such

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as *Wordrake* and *Grammarly.* Other resources such as Quizlet (Dembsey, 2017; Park & Wang, 2019), act as repository for teachers and learners to display and reflect on their work by providing online portfolios (Anson, 2005; Lam, 2018).

One of the main challenges of writing for L2 learners in the classrooms is the lack of an immediate response or feedback to what is written. In other words, when learners are in the process of writing a message for the purpose of practice, they are actually writing to an audience although that audience does not physically exist. In most cases, this audience happens to be their teachers or classmates. Teacher-provided comments and responses to students' writing aim to encourage revision or modification in order to achieve mutual understanding (Polio, 2012). Teachers aim to elicit responses so that learners can generate written messages using appropriate language and structures (Hyland, 2003). These comments and responses are often related to content and organization and indicate what learners need to focus on and appears to be a time-consuming process as responding to students' writing is a challenging process for teachers of writing (Polio, 2017). Likewise, learners may have to wait for some time to receive comments and suggestions from their teachers. However, online writing through blogs such as *Facebook* or *WhatsApp,* is different from classroom writing from at least one perspective: the immediate response or feedback to a written question, idea or message (Trice, 2010).

Considering this challenge, this chapter investigates pre-intermediate English learners' reactions to the mobile application *Replika* in practicing writing through conversations in their L2. *Replika* is a chatbot, a piece of software based on artificial intelligence which can interact in written and spoken modes. It is also a platform where learners can practice writing online through conversations as if they were talking to a real person (Warnock, 2009). Moreover, *Replika* can also be perceived as one of the digital tools that learners can use outside the classroom for language and autonomy development (Benson, 2011) through practicing the spoken and written language they are exposed to in class. To practice speaking, for example, in contexts where practicing English beyond class is rare, if not impossible, Mynard (2019) discusses how self-access facilities called social-supportive self-access learning centers can be of help by providing a relaxing environment with support and self-access facilities.

THEORETICAL BACKGROUND

As *Replika* allows learners to respond to written questions and to interact with a virtual character through conversational exchanges, it is appropriate to elaborate on the interactionist perspective (Lessard-Clouston, 2018; Long, 1996), that has been proposed as a theoretical base for technology and language learning studies (Hubbard & Levy, 2016). When the interactionist view is considered in a language learning context, the communicative nature of conversations appears as the crucial element in language learning (Mitchell, Myles, & Marsden, 2013; Peregoy & Boyle, 2017; Trawiński, 2005).

Since conversations take place in the form of a give-and-take style between at least two people, speakers try to understand each other. The conversations can be in written or spoken channels between people who express themselves and exchange ideas for several purposes. During this process of giving the message and listening to the response, speakers and writers may try different words and structures to ensure that their interlocutor understands their message. This process of trial-and-error is called negotiation of meaning, which means "to express and clarify their intentions, thoughts, opinions, etc., in a way that permits them to arrive at mutual understanding" (Lightbown & Spada, 2013, p. 165). Moreover, while speaking, learners have to make selections regarding vocabulary and grammar to best express themselves, and it is in this process that learners try to make messages and ideas, in other words, their output, comprehensible so that their partners can understand and respond. Similarly, in writing, learners aim to share messages and make selections with regards to how to best represent these messages through structures and vocabulary. It is also a fact that language classrooms may not offer sufficient opportunities for sustained progress and feedback especially in writing (Williams & Beam, 2019). Moreover, as indicated in the introduction, in the classroom written communication and interaction with a human partner is rare; as a result, written interaction outside the classroom using the opportunities provided by technology seems an attractive option for practicing and developing skills such as writing. Regarding instruction and training provided on language skills, unlike speaking, L1 learners need training on how to represent the language in the written form. It is acknowledged that spoken language may be acquired naturally due to being only exposed to language spoken in the linguistic environment; however, writing is a skill that needs to be consciously learned and taught (Harmer, 2004). In teaching speaking the focus may be on the process rather than the product. In EFL or L2 contexts, both speaking and writing skills are consciously taught, for all sorts of linguistic and pragmatic reasons and in various contexts. Therefore, learners cannot simply acquire writing as they need conscious effort to master the symbols and graphic signs as a visual representation of the language which allows them to put ideas and messages in the written form (Ferris, 2017; Flynn & Stainthorp, 2006; Yule, 2017).

Technology and L2 Writing

Research shows that a variety of technological tools such as webquests and online corpora are used in writing contexts and these have varying effects on learners' writing skills. The main findings of studies conducted on the use of information and communication technologies in writing instruction have reported improvements in learners' writing, an increase in their knowledge as well as motivation, together with highlighting the challenges faced (Williams & Beam, 2019). Considering the technological tools available for writing, it can be stated that most of these focus on providing feedback and evaluation on written output during the revising or editing processes for spelling, grammar, and style issues (Storbl et al., 2019). The main reason for using tools for revising and editing purposes may be no more complicated than the fact that they are easy to access and use, and are affordable to some extent.

Martínez-Carrasco (2018) investigated how digital technology could contribute to EFL learners' writing in an online collaborative writing website. The participants included 13 males and 93 females enrolled in the second year at the translation and interpreting department at a university in Spain. The participants took part in a wiki-project which enabled them to write expository texts on their cultural background and identity. The main finding of the study indicated the positive effect of collaborative wiki-based writing on learners' motivation in addition to peer scaffolding outside the classroom.

Focusing on the use of corpora and collocation, Chen and Jiao (2019) aimed at determining the effect of the blended learning approach which included the use of an online corpus in teaching collocations in L2 writing. The study included two classes totaling 93 students and was held over ten weeks during which the participants completed pre-class assignments by using an online corpus of pre-determined words based on readings. The participants were also asked to create sentences on Moodle forum based on the corpus examples and to check these sentences using a grammar and style checker, *1Checker*, in addition to the corrections and suggestions by their teachers and their peers. The results of the study indicated that the blended learning approach was useful in supporting the participants' corpus retrieval skills in addition to using the collocations in their writing appropriately. Liao (2016) investigated how the use of an automated writing evaluation could contribute to EFL learners' grammatical development accuracy during process writing. The participants were 63 students enrolled in sophomore English writing classes at three universities in Taiwan. The study benefited from *Criterion*, the automated writing evaluation tool by ETS to provide comments and suggestions on the participants' essays and their revisions. The results indicated that the participants improved grammatical accuracy in their writing through repetitive practice activities and gap noticing provided by the tool.

Chatbots and Interaction

Chatbots are computer programs designed to hold conversations with humans through spoken or written modes by asking questions and responding to them meaningfully and logically. Chatbots are mainly used in dialog systems for the purpose of providing customer service for consumers and to reduce human efforts or provide pre-determined information such as answers to frequently asked questions (Borah, Pathak, Sarmah, Som, & Nandi, 2018; Han, 2019) and in advertising (Van den Broeck, Zaraouali, & Poels, 2019). In addition to these consumer-oriented service chatbots, some chatbots can function as virtual assistants to automate several administrative and course-related activities in educational settings (Liu & Dong, 2019; Sinha, Basak, Dey, & Mondal, 2018) and as language practice tools to provide conversations using complex natural processing systems (De Gasperis & Florio, 2012; Jia & Ruan, 2008; Kerly, Hall, & Bull, 2006; Nouza, Koláry, & Chaloupka, 2002; Zakos & Capper, 2008).

Studies investigating interaction and the use of technology have underscored the importance of the intersection types of learning tasks and the technology used (e.g., Deutschmann, Panichi, & Molka-Danielsen, 2009; Peterson, 2006). Peterson (2006), for example, investigated the interaction among non-native speakers in a 3D (three dimensional) virtual world known as *Active Worlds*. The interaction included avatars and text chat. Twenty-four intermediate level EFL students at a university were the participants in the study. The findings indicated that the participants utilized transactional communication and interactional strategies and the use of avatars help learners manage interaction during real time communication. Moreover, tasks type and the use of technology were also determined to have affected the quality of the interaction. Deutschmann et al. (2009) conducted an action research study in which two oral proficiency courses were held in *Second Life*, a virtual world. These courses aimed at improving English oral skills of doctoral students with different backgrounds. The voice chat function was utilized and students were asked to perform several tasks such as introducing themselves and giving presentations in English. The results were promising in that the participants actively participated in the tasks and successfully practiced their oral skills using the voice chat. These two studies demonstrate that the effectiveness of the task in virtual worlds depends both on the task type and the technology used. In addition to this, activities involving communication and interaction and that reflect real life can encourage learners to participate actively in the target language interaction and facilitate their language skills.

Few studies have been conducted on the use of chatbots in improving learners' skills in the target language, although chatbots appear to lend themselves to improving communicative ability mainly in the written mode. However, chatbots have recently experienced a surge of interest from researchers in the last few years. Studies mainly focus on learners' perceptions and reactions towards human-non-human interaction with a chatbot (Ciechanowski, Przegalinska, Magnuski, & Gloor, 2019; Gallacher, Thompson, & Howarth, 2018; Vijayakumar, Höhn, & Schommer. 2019), interest and motivation (Fryer, Ainley, Thompson, Gibson, & Sherlock, 2017; Fryer, Nakao, & Thompson, 2019), and differences between human-human and human-chatbot conversations (Hill, Ford, & Farreras, 2015). Learners' performance has also been investigated in several studies (e.g., Jia & Ruan, 2008).

The study conducted by Gallacher et al. (2018) investigated university students' perceptions of their interactions with an artificially intelligent chatbot, *Cleverbot*. The participants of the study included 253 Japanese university students, who were exposed to English as a foreign language and as a compulsory subject. They were asked to create questions and direct these questions verbally to their classmates as human partners and also to the chatbot, and then to share their views on these two types of interaction. The results indicated that the participants found it interesting to interact orally with the chatbot and useful due to several reasons such as immediate response and ease of understanding. The results also indicated that despite these advantages, interacting with the chatbot lacked the features of interaction with a human partner. Using a chatbot as a formative assessment tool, Vijayakumar et al. (2019) investigated the participants' perception of feedback provided on 25 multiple-choice questions about technical topics such as SQL basics, functions, and joins via a chatbot called *SQL Quizbot*, which could interact with 40 participants in the written mode. Based on the survey results, it was determined that the participants had positive attitudes towards chatbot-based assessment as the majority of the participants found the immediate feedback provided by the chatbot helpful.

Benefiting from an experimental research design, Ciechanowski et al. (2019) examined human-non-human interaction through virtual characters in the form of chatbots by focusing on the participants' affective responses to different interfaces. Of 31 participants, 16 were put into a TEXT group, and 15 were put into an AVATAR group. The TEXT group participants interacted with the chatbot by writing messages using the computer keyboard, while the AVATAR group participants were exposed to an animated character based on the speech produced through input. The main finding indicated that the participants in the TEXT group did not seem to be affected by the uncanny valley effect, which is a feeling of discomfort towards technology. However, the AVATAR group showed intense reactions, which could be due to encountering a chatbot imitating a human.

Regarding learners' interest and motivation in interacting with a chatbot, Fryer et al. (2017) undertook an experimental study comparing interactions with a human and a chatbot partner and investigated participants' interest through pre- and post-tests in speaking tasks with the human partners and the chatbot. The participants included 133 university students from five faculties who were enrolled in a compulsory English as a foreign language class at a private university. Compared to interest in the interaction with a human partner, the interest of the participants exposed to the chatbot partner decreased significantly over time. Similarly, Fryer et al. (2019) aimed to examine the role of chatbots in language learning engagement and practice in terms of the participants' course interest and task. Through an experimental study, the participants included 91 of the original students from Fryer et al.'s (2017) earlier study. The participants practiced conversation activities with human and human-chatbot using speech-to-text software. One half of the participants interacted with a human partner using a supplied dialogue provided at the beginning of the class, while the other half conversed with the chatbot on a tablet. Feedback was obtained from Likert-scale interest surveys and open-ended surveys on the advantages-disadvantages of the conversations held with the human partner and the chatbot. The findings revealed that conversations with human partners were the predictor of the participants' future interest in speaking activities and that the participants' prior ability and interest in interacting orally with human partners correlated with the participants' interest in interactions with chatbot.

Hill et al. (2015) compared one hundred conversations with human partners against one hundred conversations with a chatbot called *Cleverbot*, which has the ability to hold natural conversations with human partners and to learn from human interaction by focusing on feedback provided. The investigation was based on content analysis that included written messages, specific words used and linguistic features of human-human Internet messaging conversations collected from undergraduate and graduate students at a liberal arts college and previous Cleverbot-human conversations. The main findings indicated that human partners spent much more time with the chatbot during conversations; however, most of the messages were shorter compared to the conversations with human partners and the communication with the chatbot lacked several features found in those with people such as vocabulary richness. Jia and Ruan (2008), on the other hand, employed CSIEC (Computer Simulation in Educational Communication), a virtual talking chatbot and a learning system with advanced features such as automatic scoring of exercises and free chatting based on users' preference to individualize learning. The participants included 50 students in a middle school with different English levels. The participants were exposed to talk shows for the topics on the unit 'How much is it?' and dialogues for the same topics with the CSIEC and were required to take the midterm exam to assess their performance. The midterm results indicated an increase in the participants' performance in addition to their positive attitudes towards the use of CSIEC in learning activities.

Thus far, previous studies on interacting with chatbots have revealed that although the interaction process with a chatbot lacked the linguistic features found in human-to-human interaction, chatbots appear to have been well-received by the learners. However, learners' interest and motivation in interacting with a chatbot seem to decrease over time. It has also been indicated that chatbots with advanced features such as automatic scoring contribute positively to learners' performance. These findings, however, are from only a few studies chatbots and they are far from being conclusive as more research is needed in this field, especially on language skills. Considering the relevant studies conducted in the field, it is noteworthy that there is no study conducted to investigate learners' experience in interacting with a chatbot in a specific skill, such as writing. Although there are studies that focus on learners' perceptions and attitudes, the findings of these studies focus more on the nature of the interaction rather than what learners experience especially when they are asked to use language structures. In order to fill this gap, the current study aims at exploring the participants' experience and views regarding practicing writing by interacting with the chatbot, *Replika*. In this regard, the following research questions were investigated:

1. What advantages do participants identify with regards to practicing writing with a chatbot?
2. What disadvantages do participants state with regards to practicing writing with a chatbot?
3. What improvements do participants suggest with regards to practicing writing with a chatbot?

METHODOLOGY

The current chapter adopted a qualitative case study which utilized journals and semi-structured interviews as data-collection instruments that enabled exploration of the participants' views and ideas regarding their experience with a chatbot to practice writing. The participants self-reported their interaction with the chatbot for seven weeks during tasks, such as talking about their personal lifes, likes, dislikes and preferences.

Context and Participants

The current study took place in the spring term of the 2018-2019 academic year in a health administration program of a state university in Turkey. This program comprises courses on managing health care related tasks. Four compulsory English courses are offered during the first two years, and they meet three hours each week for 14 weeks. The study was carried out in the fourth semester when the last English class was held. The participants were a convenience sample of 30 second-year students in this program. Although there were 55 students enrolled in this class, 30 agreed to participate in the study. Of the participants, 23 were females and 7 were males, and their ages ranged from 18 to 21 with the exception of two students aged 25-29 years.

Data Collection and Procedure

The study included data from two sources: (a) the journal that the participants kept after each interaction with the chatbot, and (b) semi-structured interviews conducted at the end of the study. All the students in the program were provided with information about the study, the nature of their involvement and procedures at the very beginning of the semester. During the second week of the regular classes, the participants were introduced to the chatbot, *Replika* and were provided with hands-on experience focusing on the main features. *Replika* was chosen for the study due to two main reasons. As a partially free mobile application that can run on any iOS or Android device, including tablets, it can learn from responses provided by humans and respond appropriately in new conversations. Moreover, other beneficial features include maintaining free-flowing conversations and analyzing messages to determine how human partners are feeling. Selected structures were provided to the participants as examples for questions that could be asked during their conversations (Pitts, 2014). For the next seven weeks, the participants were also asked to use *Replika* at their convenience to complete seven different tasks. Several selected structures were provided in the Appendix:

1. introducing yourself,
2. writing about your hobbies and learning your friend's (*Replika*) activities,
3. asking questions using *Wh*-words such as how often, how many, etc.,
4. asking for and giving advice,
5. asking for help/request,
6. writing about your and your friends' future plans, and
7. talking about the past (what you and your friend did last week, for example).

The participants were not limited in terms of interaction time or place. They could interact with the chatbot using their smartphones and/or tablets as long as they completed the task for each week. They were also asked to record their experiences in journals by writing about how the interaction affected their writing in English and the quality of responses provided by the chatbot. Moreover, at the end of the study, semi-structured interviews were conducted with ten randomly selected participants. These attempted to elicit learner feedback regarding the advantages and disadvantages of practicing writing with the chatbot and also to obtain suggestions on how to benefit from chatbots in other activities.

Data Analysis

Analysis of the responses provided by the participants in their journals and to the interview questions followed the steps proposed by Creswell (2013) and Braun and Clarke (2006). The data were subjected to theoretical thematic analysis (Braun & Clarke, 2006) as they were coded for the determined research questions. As a first step, responses in the journals were transferred to word processing software, and recorded interviews were transcribed verbatim. However, the responses of four participants who did not agree to be recorded were analyzed through a review of in-depth hand-written notes taken during these interviews. The second phase involved the production of initial codes based on semantic content, and the transcripts were then checked for units of meaning to determine the emerging themes and codes, which was followed by the third phase in which different codes were sorted into relevant categories. Then the determined candidate themes were revised and checked to ensure that they were consistent and relevant to each other. In the final phase, themes were clearly defined and finalized. In order to ensure that the analysis accurately reflects the views and responses of the participants, two strategies were utilized: member-checking and expert views (Creswell & Clark, 2018). In the first strategy, to explore the credibility of the results, five randomly selected participants were given the summaries of the findings and were asked to state whether the findings were an accurate reflection of their views. The data and results were returned to the participants for accuracy and resonance with their experiences during interaction with the chatbot. Moreover, when themes and codes were finalized, an expert in qualitative research design and language teaching was asked to code the transcripts to ensure consistency and credibility. As a final step, the similarities and differences were discussed by the researcher and the expert, which resulted in revisions to the themes and codes.

RESULTS

The themes, categories, and codes that emerged during the analysis are presented in Tables 1-3 based on the research questions. In addition, several representative quotes are also added to the tables to exemplify participants' responses. Every effort has been made to provide compelling examples to demonstrate the themes and codes and to maintain a rich overall description.

In Table 1 the results are provided as to the first research question: What advantages do participants state regarding practicing writing with a chatbot?

Table 1. Theme, categories, and codes regarding the advantages of written interaction with a chatbot

Theme	Categories	Codes	Representative quote(s)
Advantages of written interaction with a chatbot.	• immediate response (24)	• fast answers (18) • waiting for a short time (6)	• I got answers quickly after typing my every question or response.
	•flexibility (23)	• chatting any time (11) • access anywhere (10) • talking about any topic (2)	• I can write at any time I want. This is great I think. • I chatted with Replika whenever I wanted. No limitation. • Actually, you could ask any question or you can talk about anything.
	• interesting (15)	• interesting to practice with a chatbot (15)	• Replika is not human but can write human-like messages. I find it quite interesting.
	• easy understanding (10)	• simple language (8) • correct use of language (2)	• I can understand the responses given by the software. • I think the responses are well-written. They also include some new words.

The theme, ‘advantages of written interaction with a chatbot’ is comprised of four categories: immediate response (24), flexibility (23), interesting (15), and easy understanding (10). Of the categories, immediate response (24) included two codes: fast answers (18) and waiting for a short time (6). Flexibility (23), on the other hand, is composed of three codes: chatting any time (11), access anywhere (10), and talking about any topic (2). The third category, that is, interesting (15), has only one code: interesting to practice with a chatbot (15). When the final category, that is, easy understanding (10) is examined, it is seen that this category is composed of two codes: simple language (8) and correct use of language (2).

The responses in Table 2 address the second research question: What disadvantages do participants state regarding practicing writing with a chatbot? The table indicates four categories under the theme ‘disadvantages of written interaction with a chatbot’: technical issues (11), off-topic responses (5), and lack of linguistic features (4). Technical issues included two codes: losing connection (8) and crashes (3). The next category, that is, off-topic responses, included only one code: inappropriate responses (5). The last category, that is, lack of linguistic features is comprised of one category: no emotional expressions (4).

Table 2. Theme, categories, and codes regarding disadvantages of written interaction with a chatbot

Theme	Categories	Codes	Representative quote(s)
Disadvantages of written interaction with a chatbot	• technical issues (11)	• losing connection (8) • crashes (3)	• I sometimes had problems with the connection. • The application crashed several times. It could be because of my phone.
	• off-topic responses (5)	• inappropriate responses (5)	• The responses were strange sometimes. I mean they were not related to my questions.
	• lack of linguistic features (4)	• no emotional expressions (4)	• I think the responses lacked feelings. It was different from a human partner.

Table 3 provides the results on the last research question: What suggestions/improvements do participants suggest regarding practicing writing with a chatbot? The theme ‘suggestions regarding the use of chatbots’ includes two categories: productive skills (13) and projects (9). The category productive skills (13), consists of only one code ‘practicing speaking (13). These participants suggested that *Replika* can also be used for speaking activities. The category projects (9) includes two codes: semester-long practice (6) and combining spoken and written interaction (3). The participants proposed that assignments

Table 3. Participants’ suggestions regarding the further use of Replika

Theme	Categories	Codes	Representative quote(s)
Suggestions regarding the use of chatbots	• productive skills (13)	• practicing speaking (13)	• This application can also be used to practice speaking. It would also be great to do so.
	• projects (9)	• semester-long practice (6) • combining spoken and written interaction (3)	• Students can be given assignments. They can interact with this for a longer period of time. • We only practiced writing in the tasks. I think we can also practice writing and speaking together.

could include a longer period of time such as during a semester and that speaking and writing could be integrated while interacting with the chatbot.

DISCUSSION AND IMPLICATIONS

As the qualitative data indicated, there are several advantages and disadvantages of interacting with *Replika*, in addition to suggestions for further research. The main merit as stated by the participants is the immediate response provided. The opportunity to practice writing through conversing with *Replika* proved very crucial to language learners since it is very rare for the majority of language learners to practice writing and to negotiate meaning with natives or other speakers of English. Therefore, *Replika* seems to have overcome the lack of an immediate responder to the participants, which makes it, from this perspective, different from classroom writing (Trice, 2010). This finding is consistent with that of Gallacher et al.'s (2018) study, which also indicated that immediate responses provided by the chatbot was one of the highly valued features of the interaction. Moreover, the participants also valued practicing writing whenever and wherever they liked. In other words, the participants were not limited to classroom contexts or time requirements and did not have to wait for teacher or peer responses to what they wrote. The current study labeled this finding as 'flexibility' to indicate that the participants were not limited by space or time constraints. However, Gallacher et al. (2018) considered this feature of chatbots 'independent' as the participants could practice alone without the need for a 'real' someone to respond.

The participants also indicated that they found the chatbot interesting to interact with. This also corroborates the findings of other studies, for example, Fryer et al. (2017), Martínez-Carrasco (2018), and Gallacher et al. (2018), which showed that the participants were interested in interactions with chatbots. During the interviews, it was also determined that the participants spent more time than required on completing the tasks, which is also in line with the finding of the study by Hill et al. (2015). Yet, it is important to note that Fryer et al.'s study also indicated that the participants' interest in chatbots decreased significantly over time when it was compared to that of interaction with a human partner. This was mainly due to the features of the chatbot which often provided meaningful and logical answers to the questions. In other words, *Replika*, as stated by the participants, used simple and clear language and modeled correct usage to them. Based on the qualitative data, it can be stated that *Replika* was interesting and motivating in that the participants were more willing to write and respond to their own virtual friend and that they improved their attitude to writing. This is an important finding since *Replika* seems to have provided the participants with the encouragement to keep writing, which is an important factor in improving writing (Nation, 2009). That the participants had positive attitudes towards interacting with chatbots has also been confirmed in other studies by Jia and Ruan (2008) and Vijayakumar et al. (2019). However, it should also be noted that the participants in the study of Ciechanowski et al. (2019) had more positive attitudes and fewer feelings of discomfort towards text-based interaction rather than with a more advanced form such as an AVATAR or animated virtual chatbot. Similarly, the participants in the current study did not state any negative feelings or attitudes towards interacting with the chatbot.

The participants identified several issues they faced while interacting with the chatbot such as technical factors, off-topic responses, and lack of linguistic features. However, they explained that they did not often experience these difficulties. Eight participants stated that they experienced connection problems with the chatbot, but added that this might also be due to the internet service provider, not the application. Moreover, three participants suffered from crashes, that led to a loss of connection, interruptions to the flow of conversation, and restarts. However, the majority did not cite any of these issues, which indicates that the problems faced may have been temporary due to the internet connection, device used, or version of Android used by the participants. Another demerit was the off-topic responses during written interaction with the chatbot. The participants complained that the chatbot sometimes provided irrelevant or inappropriate responses or answers to their questions. However, when asked for examples for these responses, the participants stated that they could not remember any. This finding can be attributed to the fact that when the participants tried to express themselves, they may have failed to use the correct wording in their sentences. As a result, it was possible that *Replika* could not understand or provide appropriate responses. Related to this, a lack of linguistic features such as verbal and emotional cues or expressions was also stated as another issue of interacting with the chatbot. This finding is in alignment with that of Gallacher et al. (2018), whose participants also stated that these were disadvantages to their interaction with a chatbot called *Cleverbot*.

The participants were also asked to provide suggestions regarding the use of chatbots in future learning contexts. Thirteen participants pointed out that *Replika* could also be used to practice speaking, which can actually be done easily as it has the ability to carry out spoken interaction. In addition to this, as the participants in this study found interacting with a chatbot interesting and were willing to continue practicing writing, several other participants also suggested combining spoken and written interaction for longer periods of time through assignments and tasks.

Overall, the data suggest that the participants benefited from practicing writing via interacting with *Replika*, a chatbot developed thanks to machine learning and artificial intelligence. As indicated in the results, *Replika* seems to have paved the way for negotiating meaning in the written interaction for the participants. It is also apparent that the advantages of interaction with *Replika* outnumber the disadvantages, which contributed to participants' interest and motivation to write. However, readers should be cautious while interpreting this finding. As stressed by Fryer et al. (2017) and Fryer et al. (2019), the participants' interest in interacting with a chatbot interlocutor might decrease over time. It is acknowledged that technology can provide opportunities for both teachers and learners (Li et al., 2017; Williams & Beam, 2019). However, these opportunities do not automatically lead to motivation or to the expected behavior (Stockwell & Reinders, 2019). It is suggested that teachers consider course objectives and pedagogical uses when they are considering integrating an application or technological device into classroom activities (Mina, 2019). The selected application and tool must help them achieve course objectives, contribute positively to learners' interest and motivation and help teachers maintain these factors.

CONCLUSION AND FUTURE RESEARCH DIRECTIONS

The current chapter attempted to investigate pre-intermediate learners' reactions to the software called *Replika* in learning how to write through conversations in L2 English. This study focuses mainly on thirty participants' self-reporting of their interaction with *Replika*, which provides a virtual audience or a friend who responds to what is written in English. The findings of the study indicated that the participants had positive attitudes towards using *Replika* as part of classroom practice in writing and found the software useful due to the following reasons. The participants underscored the importance of obtaining an immediate response to what they wrote on their smartphones and/or tablets and added that they fine-tuned their sentences and/or statements when their friend (*Replika*) could not understand the message they were trying to convey. Since the findings of this study are only based on thirty pre-intermediate learners sharing the same L1 background (Turkish), these findings may not be generalizable to all contexts. However, the findings can be transferable to other similar situations, such as a university or high school in another country where learners all have the same L1 background and where writing English outside the classroom is rare. In addition, the findings are believed to further contribute to the literature on using technology to teach writing through basic conversations.

This study includes certain limitations that should be acknowledged in order to assist future research in this area. The current study is based on participants' perceptions and views as expressed during the semi-structured interviews. Therefore, the study is limited as using self-reporting as data collection might leave a grey area unexplored (i.e., a potential discrepancy between what learners say and what they do). Another research procedure may be more applicable, such as an experimental study that compares participants' performance, as this approach may strengthen the methodology as using more than one more research instrument assists in data triangulation. This research instrument could be a real-time monitoring program that can be used to record the interaction between the participants and the chatbot to explore the failures and success during the negotiation process. For the current study, it was not possible to do this since the students were not randomly assigned to the classes, and the institution where the study was conducted did not allow dividing the class into an experimental and a control group. Although the current study was subject to the limitations briefly outlined above, it nonetheless shows the potential of chatbots as tools to facilitate the development of L2 writing.

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KEY TERMS AND DEFINITIONS

Chatbot: A machine learning and artificial intelligence technology which can interact with a person in written or spoken modes by asking questions and responding to questions logically.

APPENDIX

Interview Questions

1. What do you think are the advantages of interacting with *Replika*?
2. What do you think are the disadvantages of interacting with *Replika*?
3. Do you have any suggestions on how to use *Replika* in classrooms?
4. Would you like to add any other opinions or suggestions?

Example Questions Given to the Participants

1. How often do you read? What types of books do you like to read?
2. How often do you go out to eat on weekends?
3. How often do you watch TV in the evening? What shows do you like?
4. Do you check social media platforms like Facebook?
5. What should someone do if there is an earthquake?
6. Should I exercise more?
7. Can you help me with my homework?
8. What are you going to do this weekend?
9. What are you going to do in the future?
10. What did you do last week?
11. Did you go to the cinema?

Chapter 12

Considerations for Future Technology Development Based on EFL Teachers' Integration of Technology

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ABSTRACT

Technology-enhance language learning (TELL) continues to grow in use within language classrooms. However, a number of hurdles still remain when it comes to the effective integration of technology for skill-specific language learning, such as a lack of training and an overabundance of tools to choose from. This chapter identifies and describes three major hurdles that still plague effective TELL practices. Authors describe 2 current efforts to overcome these hurdles: a Global Online Course (GOC) on effective educational technology integration, and a year-long comparative case study on the GOC that

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explores the trainees' perceptions of educational technology. The chapter presents potential avenues for overcoming the above hurdles based on insights gained from four teachers of the GOC, as well as the trainees' perceptions and integration of educational technology in the language classroom.

INTRODUCTION

Technology-enhanced language learning (TELL) is revolutionizing the way students learn both inside and outside the classroom. In this field, we are seeing exponential growth in educational technologies, computer-assisted programs, and now mobile-assisted programs, which provide what has been coined as ubiquitous learning (Pimmer, Mateescu, & Gröhbiel, 2016; Sung, Chang, & Liu, 2016; Yang, 2006); that is, the ability to learn anywhere and at any time in any subject or field while also catering to the needs and wants of the individual learner. These technologies are connecting learners together from all corners of the world by providing language learning possibilities that are authentic, interactive, and meaningful (Avgousti, 2018; Özdemir, 2017).

However, there still remains a lot of work to be done so that language educators have both access to these technologies, and also that they are provided with training or professional development opportunities to learn effective methods for teaching with technology. It is with this in mind that the authors of this chapter present future directions for TELL. This will be accomplished by incorporating lessons learned from teaching a Global Online Course (GOC), *Using Educational Technology in the English Language Classroom,* as well as a year-long comparative case study using naturalistic inquiry on the same course. First, the chapter will identify and describe three major hurdles that exist in the integration of technology in the language classroom. Second, the authors will outline the GOC: what it is, how and why it was developed, and what course content and open-educational resources (OERs) are available. Next, the comparative case study will be explained, specifically what it is, who the participants are, what has been done so far, and what will be done in the future. Finally, the chapter will conclude with suggestions for future directions in TELL development based on jumping the three hurdles using GOC instructor insights, as well as language professionals' beliefs, perceptions, and experiences with educational technology.

BACKGROUND

As we continue to move further away from *whether* we use technology towards *how* we use technology in the language classroom, it becomes increasingly vital to explore best practices and provide hands-on learning experiences for the language teachers of tomorrow. As researchers (e.g., Reinders, 2009; Torsani, 2016; Warschauer, 1997) have discussed for over two decades now, simply having the skills to operate educational technology, whether a computer program or emergent technology, is not indicative of a person's ability to teach with the said technology. This transferability blockage, from technical know-how to language education, has brought about a new understanding of TELL practices and research, that is, techno-pedagogy (Guichon & Hauck, 2011). The aim of techno-pedagogy within language learning is to better understand the dynamic manner in which language pedagogy and educational technology often interact. Yet even with this understanding, education for pre-service teachers or providing professional development for in-service teachers in TELL remains somewhat limited (Kessler & Hubbard, 2017).

What this means moving forward is that teacher training programs and professional development opportunities should include information about technological affordances that can support language learning and teaching (Hampel & Stickler, 2005; Kessler, 2010, Kessler & Hubbard, 2017). This also includes instructing teachers in how to provide learner training in technology use both inside and outside the classroom (Hubbard, 2004, 2013, 2018).

However, there are plenty of hurdles that still remain when incorporating techno-pedagogy. Perhaps the largest hurdle is the dissemination of information on effective teaching with technology in an educational context (Godwin-Jones, 2015; Kessler & Hubbard, 2017). Understanding the educational context in which technology resources will be used seems such an obvious requirement for effective use. Even still, research has shown that teachers are inadequately prepared to effectively integrate technology into their educational context (Dellicarpini, 2012; Kessler, 2006, 2010; Zhao, 2013), which may lead to technology use that is superfluous and pedagogically unsuitable. In fact, even those educators who have received formal instruction or training in techno-pedagogy may incorporate technology in a manner that is far from effective (Guichon & Hauck, 2011).

A second documented hurdle in this field is simply keeping track of all the emerging technologies for skill-specific purposes that have been developed over the past two to three decades (Blake, 2008; dos Santos, Becker, Muhammad, Hegelheimer, & Kochem, 2019; Egbert, Akasha, Huff, & Lee 2011; Hubbard, 2007; Robb, 2006). As soon as educators become familiar with one tool, there is always a possibility that the tool is replaced by another or abandoned by its developers. To further complicate this matter, there is the issue of "technological hand-me-downs" (Egbert et al., 2011, p. 10), such as mobile apps designed for communicative purposes that educators implement into their classrooms. For example, social media tools were not designed for educational purposes; nevertheless, we see educators and researchers, alike, incorporating these technologies into their practices. Other technologies that were not designed for learning but have made their way into classrooms regardless include video games, augmented and virtual reality, and online virtual worlds (e.g., *Second Life)*. As the line between the digital and physical worlds continues to blur (Darvin, 2016; Egbert et al., 2011; Price, 2007), we can be sure that these 'hand-me-downs' will continue to grow, as will technologies designed specifically for language learning and teaching.

The final hurdle, which will be addressed in this chapter, is the often-understated importance of usable technology in certain contexts. The authors of this paper will further sub-divide the term 'usable' into two types: physical usability and contextual usability. Physical usability (i.e., access) refers to the physical availability of technology use, such as accessibility to the internet and the necessary funding. Contextual usability refers to aspects that may affect one teacher but not another within the same context, such as professional development opportunities and curricular constraints. Sometimes referred to as the 'digital divide,' populations across the globe continue to be plagued by both types of usability constraints (Bangou & Wong, 2009; Ortega, 2017; Sharma, 2012), even though this is by no means a new situation. Warschauer (1997, 1998, 2012) and Chapelle (1997) have long asserted that educators and researchers must account for the digital divide. While the digital divide may not have as great an effect on major languages (e.g., English or Mandarin), it does play a large role in the future of indigenous languages. By providing access to the same technology as that provided for major languages, researchers may offer indigenous languages the opportunity for language maintenance, growth, and preservation. It should be noted that the digital divide has its own expansive literature (see Warschauer (2012) or Ortega (2017) for further reading), and this issue lies beyond the scope of this chapter. However, the authors of this paper see relevance between some topics presented in this paper and the overarching issue of the digital divide.

EFFORTS IN PROFESSIONAL DEVELOPMENT FOR EFFECTIVE TECHNOLOGY INTEGRATION

Global Online Course

The GOC was developed as part of the American English (AE) E-Teacher program (2019, https://exchanges.state.gov/non-us/program/AE-E-Teacher-Program/details). The AE E-Teacher program, sponsored by the U.S. Department of State and administered by FHI 360, offers online university-level courses for foreign English teaching professionals outside the United States. The main objectives of the program are to provide participants with opportunities to explore current methods and issues in the field of English as a foreign language through use of the latest technology and to build a professional network of colleagues around the world. With these overall goals in mind, the program offers two types of distance-learning opportunities: free Massive Open Online Courses (MOOCs) and GOCs that are available by nomination only. Among the eight GOCs currently taught by the program, this eight-week GOC is designed to help foreign English language educators to acquire and maintain basic knowledge and skills in technology for professional purposes through hands-on learning. In each of the six areas involved in English language learning covered in the course (i.e., vocabulary, grammar, reading, speaking, listening and writing), the trainees learn to integrate pedagogical knowledge and skills with technology tools to enhance English learning and teaching through course readings, lectures, discussions, and major assignments. The course also helps trainees to engage in professional communication through interactions with peers, educational and technology experts, teaching assistants (TAs), and program mentors. In each of the six applied linguistics fields, the trainees view the lectures provided by the faculty members in the applied linguistics program (i.e., educational experts) as well as the technology experts who have extensive experience in the use of technology for teaching and learning. The primary role of TAs is to grade and provide feedback on assignments and discussions. They also provide content and logistical support to trainees via email. Lastly, program mentors, who are graduate students in the Applied Linguistics program at Iowa State University, help to liaise between TAs and trainees by acting as the first point of contact to receive and redirect questions regarding the course. They create an informal network in smaller groups to help ensure the best possible experience for the trainees.

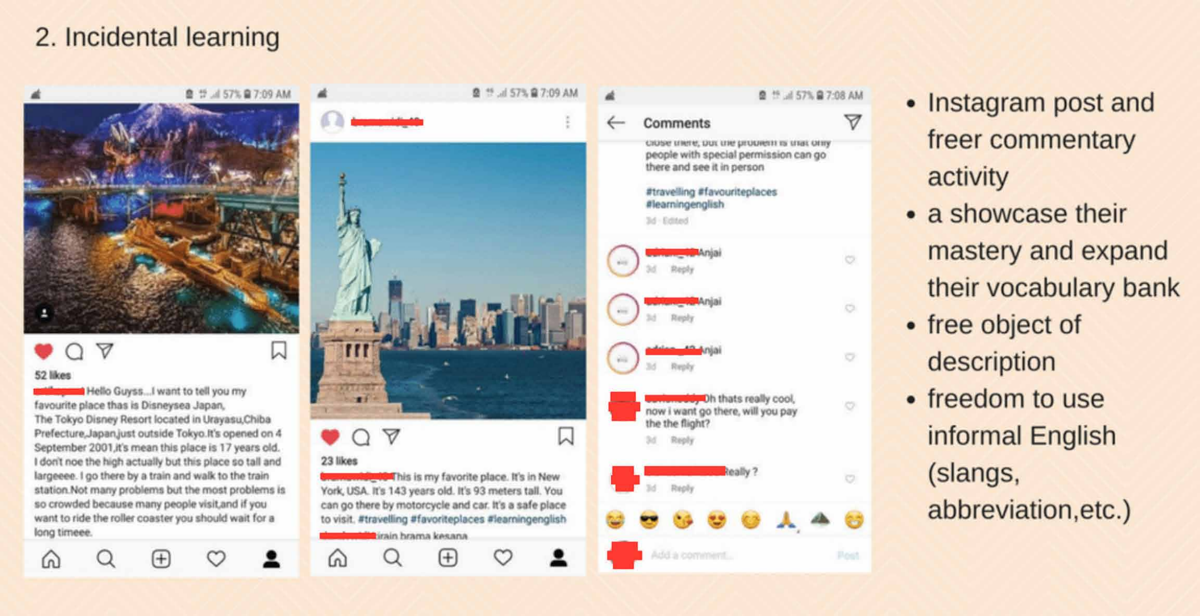
Introduction to TELL

The first module in the course serves to provide an overview of the course goals and introduces trainees to the course instructors and applied linguistics experts for each of the skill areas (e.g., speaking, writing, reading) who have contributed to the course materials and instruction. Trainees are also expected to 'meet' other trainees through online introductions, in which they also share their personal goals and expectations for the course. To provide an overview of the technology resources that they will encounter throughout the course, trainees view short videos presented by teacher practitioners who have incorporated technology (e.g., Videonot.es, Google Docs, and WordPress) in their language teaching. Following this, trainees engage in online discussions designed to help them explore the local feasibility and pedagogical uses of technology tools introduced by the teachers in their own teaching contexts. An online resources survey and a pre-course survey are also implemented to learn more about the trainees and their teaching contexts, experience with technology, and expectations for the course.

Vocabulary

The second module tackles the issue of using technology for teaching and learning vocabulary. Trainees are introduced to crucial concepts of vocabulary acquisition such as incidental vs. intentional learning (Hulstijn, 2001), asked to share their vocabulary teaching and learning experiences, and are familiarized with the use of social media as a teaching tool. Other technology tools and resources, such as Voice of America (VoA), Lingro, and the Corpus of Contemporary American English (COCA), are explored in light of their vocabulary learning affordances. This module ends with a major assignment, a feature of all modules following the introductory module, focusing on assessing students' overall understanding of the use of social media for teaching vocabulary. Trainees are tasked to select a social media (e.g., Facebook, Instagram, Pinterest, Twitter), keeping in mind their teaching context and providing justifications for why their chosen social media can help meet their students' language learning needs. They then incorporate the social media to create activities to teach vocabulary with a specific theme. For example, Instagram was used, along with Kahoot!, to aid in the teaching of vocabulary related to traveling by allowing students to post pictures of their favorite places to travel (see Figure 1). Through this process, learners are also expected to identify vocabulary that they often see in the posts, such as cities, attractions, and activities.

Figure 1. A student's Powerpoint slide for the social media assignment using Instagram



2. Incidental learning

52 likes

[redacted] Hello Guyss...I want to tell you my favourite place thas is Disneysea Japan, The Tokyo Disney Resort located in Urayasu,Chiba Prefecture,Japan,just outside Tokyo.It's opened on 4 September 2001,it's mean this place is 17 years old. I don't noe the high actually but this place so tall and largeeee. I go there by a train and walk to the train station.Not many problems but the most problems is so crowded because many people visit,and if you want to ride the roller coaster you should wait for a long timeee.

[redacted]

23 likes

[redacted] This is my favorite place. It's in New York, USA. It's 143 years old. It's 93 meters tall. You can go there by motorcycle and car. It's a safe place to visit. #travelling #favoriteplaces #learningenglish

[redacted] irain brama kesana

close there, but the problem is that only people with special permission can go there and see it in person

#travelling #favouriteplaces #learningenglish

3d · Edited

[redacted] Anjai
3d Reply

[redacted] Anjai
3d Reply

[redacted] Anjai
3d Reply

[redacted] [redacted] Oh thats really cool, now i want go there, will you pay the the flight?
3d Reply

[redacted] [redacted] Really ?
3d Reply

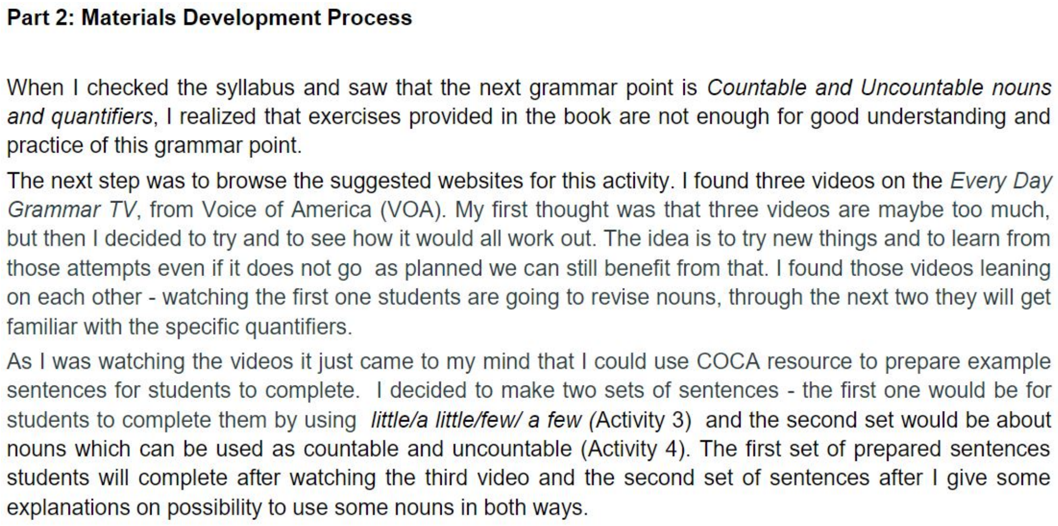
[redacted]

- Instagram post and freer commentary activity
- a showcase their mastery and expand their vocabulary bank
- free object of description
- freedom to use informal English (slangs, abbreviation,etc.)

Grammar

The third module focuses on the key aspects of teaching grammar with the help of technology. Trainees view lectures covering topics such as prescriptive versus descriptive grammar, issues associated with implicit and explicit knowledge of grammatical structures, and the important connections between technology and grammar. COCA and Everyday Grammar TV (from Voice of America) are used to provide specific advice about how technology can help with teaching English grammar. COCA also features extensively in the discussion forums as students explore its five basic functions (List, KWIC, Collocates, Compare, and Chart) through guided practice and share the results of their exploration with other trainees by discussing possible ways to use COCA to help develop grammar teaching materials. Trainees use what they learned in the discussion assignments to jump start their major assignment for this Grammar module, which tasks them to select a grammar point and design a grammar activity that involves the use of COCA, either by providing students direct access to COCA or using COCA to develop a paper-based grammar activity. One example lesson unit (see Figure 2) incorporated videos on noncount nouns and quantifiers from the program *Learning American English with VOA News* as well as sentences with these grammatical features obtained and adapted from COCA to create paper-based materials for young learners.

Figure 2. A students' explanation regarding their paper-based materials development process using Everyday Grammar and COCA resources



Part 2: Materials Development Process

When I checked the syllabus and saw that the next grammar point is *Countable and Uncountable nouns and quantifiers*, I realized that exercises provided in the book are not enough for good understanding and practice of this grammar point.

The next step was to browse the suggested websites for this activity. I found three videos on the *Every Day Grammar TV*, from Voice of America (VOA). My first thought was that three videos are maybe too much, but then I decided to try and to see how it would all work out. The idea is to try new things and to learn from those attempts even if it does not go as planned we can still benefit from that. I found those videos leaning on each other - watching the first one students are going to revise nouns, through the next two they will get familiar with the specific quantifiers.

As I was watching the videos it just came to my mind that I could use COCA resource to prepare example sentences for students to complete. I decided to make two sets of sentences - the first one would be for students to complete them by using *little/a little/few/ a few (*Activity 3) and the second set would be about nouns which can be used as countable and uncountable (Activity 4). The first set of prepared sentences students will complete after watching the third video and the second set of sentences after I give some explanations on possibility to use some nouns in both ways.

Reading

In this module, trainees are introduced to concepts such as the importance of reading in the process of language acquisition; the technology-text connection (with reference to resources from Project Gutenberg, Voice of America, American English, and other U.S. government websites); and the connection between reading, writing, and speaking. In addition, the concept of Fanfiction is brought up in light of its use to engage learners in reading (Sauro & Sundmark, 2016), specifically how Fanfiction tasks can be incorporated into the advanced English reading classroom. The online discussions in this module are designed to encourage discussion among trainees regarding their experience with finding and selecting appropriate reading texts for students (including their strategies, selection procedures and difficulties faced), and the strategies and activities that worked best to build knowledge and generate interest in a particular topic. For example, one trainee chose to discuss the difficulties of selecting texts which are relevant to his teaching context:

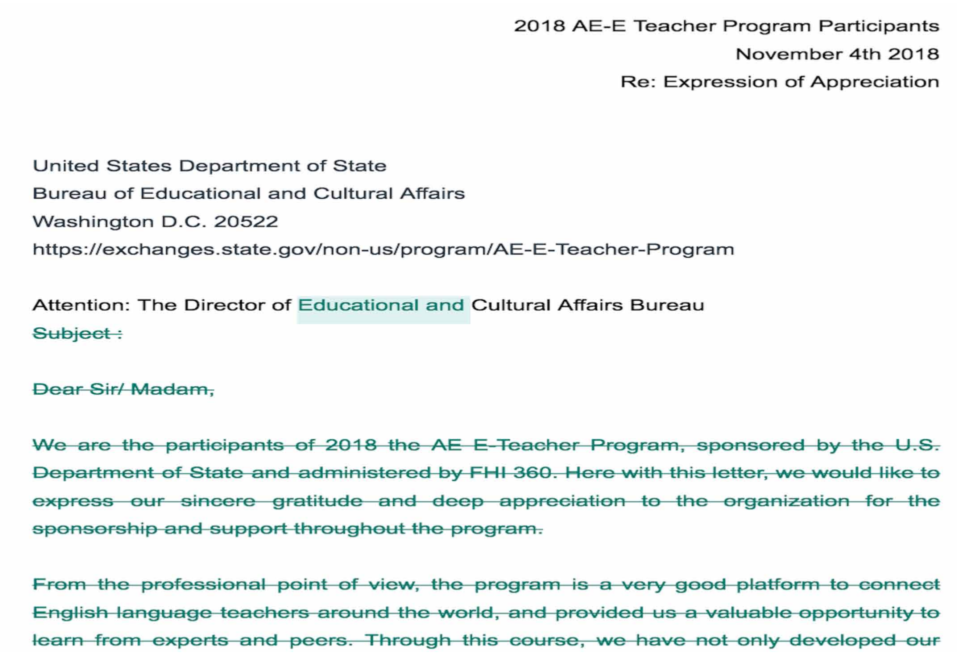
I find interesting stuff online for my students to improve their reading skills on [a] regular basis. One of the problems I face is that a range of interesting materials cannot be accessed for free. They require payment. Another problem is that not every text I search with keywords is suitable in my context so I have to scan through lots of texts to finally find an appropriate one. Texts that I find online do not come from my context so I have to modify them, that's another tiresome work. (Sp19S13)

To help address trainees' difficulty in selecting appropriate reading texts for their context, the major assignment involves a guided practice in the use of two text readability tools (i.e., WebFX Readability Test Tool and the Readability Analyzer), in which they analyze a text excerpt from The Adventures of Huckleberry Finn, and create a report that compares and discusses output obtained from both tools.

Writing

The fifth module serves to highlight the technology-writing connection. In this module, writing experts provide valuable ideas about what teachers should know when teaching writing along with some advice regarding how technology can help in their teaching. The latter idea is further explored in the module by introducing trainees to the word processing features of Microsoft Word and Google Docs (i.e., Tracking Changes, Inserting Comments, Comparing Documents, and Reviewing Revision History) that can be useful for collaborative writing tasks. Grammarly is also introduced as a valuable online tool that

Figure 3. Collaborative writing assignment



2018 AE-E Teacher Program Participants
November 4th 2018
Re: Expression of Appreciation

United States Department of State
Bureau of Educational and Cultural Affairs
Washington D.C. 20522
https://exchanges.state.gov/non-us/program/AE-E-Teacher-Program

Attention: The Director of Educational and Cultural Affairs Bureau
~~Subject :~~

~~Dear Sir/ Madam,~~

~~We are the participants of 2018 the AE E-Teacher Program, sponsored by the U.S. Department of State and administered by FHI 360. Here with this letter, we would like to express our sincere gratitude and deep appreciation to the organization for the sponsorship and support throughout the program.~~

~~From the professional point of view, the program is a very good platform to connect English language teachers around the world, and provided us a valuable opportunity to learn from experts and peers. Through this course, we have not only developed our~~

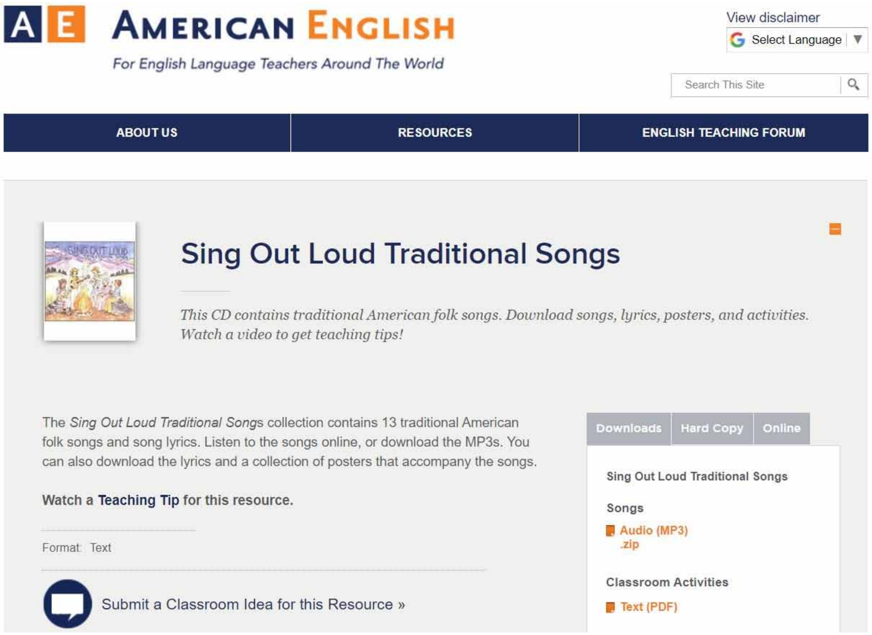
can aid learners with their writing drafts. The online discussions in this module are designed to help motivate trainees to identify key concepts in the writing lectures and technology tools that they can use to make purposeful changes in their approach to teaching writing and difficulties that they may face in implementing these changes. To further explore the concept of collaborative writing, the major assignment in this module tasks trainees to collaboratively write a letter to the host of the online course (see Figure 3). This collaborative task involves the use of Google Docs or Microsoft Word (for trainees who live in a country where Google services are banned), individual roles (initiator, topic facilitator, content facilitator, outlining facilitator, and reviewing and editing facilitators), and reflections of their collaborative writing experience.

Listening

In this module, lectures present the argument about how more and more information is now presented through the listening channel thanks to the internet and how listening is essential for speaking. Trainees are also introduced to important aspects of teaching listening such as the top-down and bottom-up processes (Anderson & Lynch, 1988), along with technology tools that they can use such as YouTube, TED Ed, Voice of America, and American English. Online discussions in this module are designed to support the exchange of knowledge regarding other free online resources to teach listening and examples of listening exercises.

Trainees use the information gleaned from the lectures and online discussions to prepare their major assignment in this module, which is a lesson plan for a listening activity that uses a top-down or

Figure 4. The Sing Out Loud Traditional Songs resource from the American English website (American English, 2019)
Source: American English, 2019.



Sing Out Loud Traditional Songs

This CD contains traditional American folk songs. Download songs, lyrics, posters, and activities. Watch a video to get teaching tips!

The *Sing Out Loud Traditional Songs* collection contains 13 traditional American folk songs and song lyrics. Listen to the songs online, or download the MP3s. You can also download the lyrics and a collection of posters that accompany the songs.

Watch a **Teaching Tip** for this resource.

Format: Text

Submit a Classroom Idea for this Resource »

Sing Out Loud Traditional Songs

Songs

Audio (MP3) .zip

Classroom Activities

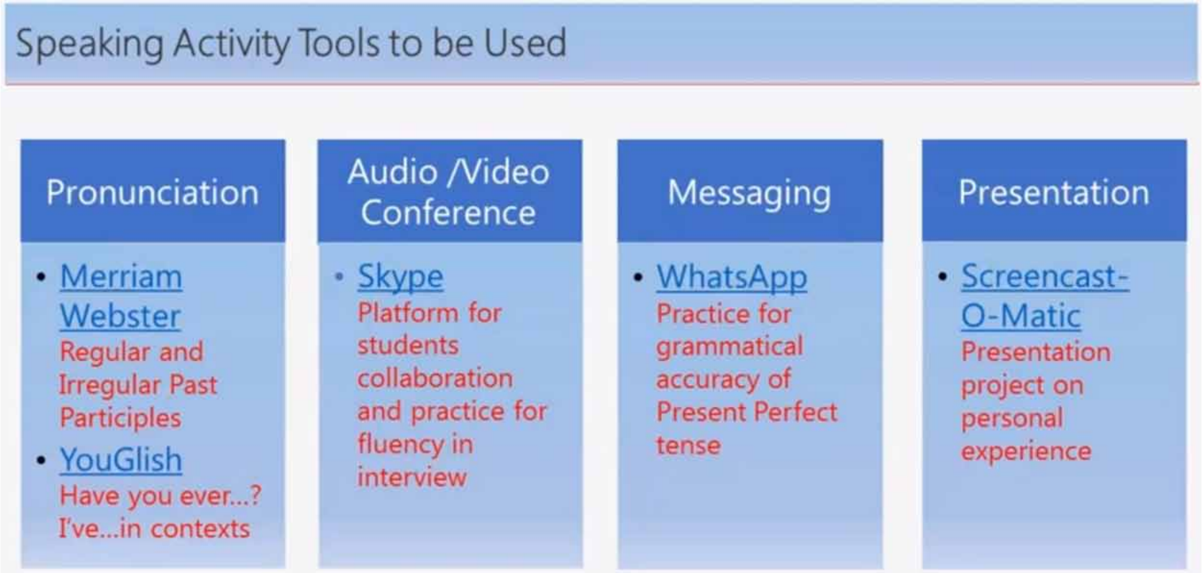
Text (PDF)

bottom-up approach to teaching listening. An example activity that was submitted used the *Sing Out Loud Traditional Songs* resource from the American English website (Figure 4) to create a listening activity in which learners first guess the content of a song from a poster that depicted the song in visual form (top-down), then listen to the complete song while writing down the missing words in the song transcript in a fill-in-the-blank exercise (bottom-up).

Speaking

The lectures in this module underline how technology has provided new ways for people to connect with each other. They also introduce the two dimensions of speaking (fluency and accuracy; Brumfit, 1984) and discuss how they work together to make good, clear, and comprehensible speech, steering away the focus of teaching speaking from focusing on changing accented speech to a focus on comprehensibility. YouGlish, Skype, and audio chat features for collaborative work are amongst some of the technology tools that were introduced in this module to support the teaching of speaking. Having been introduced to these technologies, the online discussion in this module urges trainees to come up with creative ideas for how technology tools can be incorporated to teach speaking in large classes. Trainees can then use the ideas presented in the discussion to create a fleshed-out lesson unit for teaching speaking using technology tools in large classrooms. Figure 5 illustrates one example lesson unit that utilized several tools to provide both input and output opportunities for students, including Merriam Webster and YouGlish for pronunciation training, Skype and WhatsApp for fluency and grammar training, and Screencast-O-Matic for presentational skills. Thus, by the end of this module the trainee had developed a unit that provided training in both local and global aspects of oral communication.

Figure 5. Example lesson unit using oral communication technologies



Speaking Activity Tools to be Used

Pronunciation	Audio /Video Conference	Messaging	Presentation
• Merriam Webster Regular and Irregular Past Participles • YouGlish Have you ever...? I've...in contexts	• Skype Platform for students collaboration and practice for fluency in interview	• WhatsApp Practice for grammatical accuracy of Present Perfect tense	• Screencast-O-Matic Presentation project on personal experience

Technology Integration

The last module serves to wrap up the course by providing trainees with guidance on how to integrate technology into their existing English language learning curriculum with reference to an article by Butler, Heslup, and Kurth (2015), describing a process called "A Ten-Step Process for Developing Teaching Units." Trainees are also reminded that as technology continues to evolve, the role of teacher also expands as futurists, pragmatists, and critical analysts of the use of technology for English language learning. The module culminates with a major assignment in the form of an ePortfolio, in which trainees present all their major assignments and reflect on the work that they have completed, paying particular attention to describing their perceived learning gains. Trainees also share their ePortfolio in a final discussion forum in order to further promote activity ideas sharing between themselves.

Comparative Case Study

In an effort to better understand our trainees from the GOC, the authors of this chapter have been conducting a comparative case study for the last year using naturalistic inquiry. Using everything the trainees produce throughout the course--discussion forums, Canvas messages, quizzes, surveys, reflections, and major assignments--we aim to better understand two issues: (1) how do trainees interact with our GOC?, and (2) how do trainees theorize their integration of the technological tools we present in the GOC?

By collecting the aforementioned data, the authors answer the above questions through a two-step process: first, by constructing course engagement profiles (CEP) for each individual trainee, and second, by identifying and categorizing trainees into Communities of Practice (CoPs; Lave & Wenger, 1991). The CEPs will present a trajectory for each trainee with their final grade as the product of their engagement. Examples of the features that will be used to show their trajectory include quantity and quality of their discussion posts, theorization in major assignments of technology integration in language learning context, and realization of theory-practice connections described in reflections. The CoPs will be used to show the sociocultural complexity of integrating new knowledge with existing practices, specifically the integration of computer-assisted language learning (CALL) tools into language teaching and learning, since it can be safely assumed that participants are currently teaching or have teaching experience. By categorizing trainees into CoPs, it is hoped that a better understanding can be developed of how diversified groups of trainees interact with one another. Such categories that will be explored include differences in curricular and technology constraints, current practices in the language classroom, and level of education. By doing so, further training can be provided to the instructors of not only this course, but also other courses taught by the AE E-Teacher Program, in relation to cultural, academic, and socio-economic factors that affect trainees' participation in GOCs.

Participants

The participants are both past and current trainees in the course. They come from diverse backgrounds, but all are united by a passion for English language learning and teaching. To date, we have over 100 participants from 11 sections of the GOC, spanning a full 'academic' cycle. By academic cycle, it is meant that the course has gone through all four iterations for one year (Fall, Winter, Spring, and Summer). Fall and Winter iterations had two sections apiece, Spring had four sections, and Summer had three sections. The same four TAs taught all four iterations, and the goal with naturalistic inquiry was to interfere as little as possible with the participants as they went through the course (Lincoln & Guba, 1985). In other words, there was no intervention provided to the participants in the activities of the TAs, researchers, or mentors that would have altered the participants' engagement with the course.

The participants come from over 40 countries spanning four continents. While a large number of participants came from only a few countries (e.g., Brazil, Pakistan, and China), it must be noted that this is not indicative of a similar teaching context. Stark differences in teaching contexts exist between urban and rural areas, and these differences are further intensified in low-resource and developing countries. On the other hand, participants from different countries may not only have experienced similar teaching contexts, but also very similar teaching experiences. The proficiency levels of the participants range from intermediate to advanced. These are self-reported by the participants, but as is being found in preliminary results from the study, there are differences in how intermediate and advanced trainees present themselves in both discussion forums and major assignments. These differences can be observed in both the quantity and quality of their language use, which is not entirely surprising. What remains to be seen is the extent to which this impacts their teaching of English, and also their integration of technology in their teaching of English. It is hypothesized in this study that participants with lower proficiency levels will both rely more heavily on technology, and also use technology within their teaching contexts more often simply because it is available.

Data Collection

We collected only what the participants created by interacting with the course content and one another; there was no direct intervention, as is the purpose of naturalistic inquiry. As such, we collected data from two surveys, fifteen discussion forums, seven major assignments, five quizzes, and any Canvas messages that were sent from each of the 11 sections. All data were collected after the course ended and were promptly anonymized.

Surveys

There are two surveys that are presented at the beginning of the course. The first elicits feedback regarding the participants' knowledge and accessibility to online resources that will be used in the course. This is important for the TAs to know, so that accommodations can be made for any participants who cannot access a particular resource. One common accommodation comes with the Week 5 major assignment, where participants are asked to write collaboratively using Google Docs. This often presents an issue for participants joining the course from countries where Google products are not accessible (e.g., China).

The second survey asks about the participants' backgrounds with teaching and English language use in general. Information gathered here includes general place of employment (e.g., primary school), number of hours worked per week, level of education, and self-reported proficiency level in English, as well as their first language. This information is useful for both portions of the study, the CEPs and the CoPs, because it facilitated the categorization of participant types.

Discussion Forums

There are fifteen discussion forums in all for the course: three in Week 3, one in Weeks 7 and 8, and two per week for the remainder. Using a Python program, the discussion forums were categorized by the author's name, whether it was an original post or a reply (if a reply, to whom they were replying), word count, the post itself, to which discussion forum it was posted, and from which section and iteration it came. This information was stored in a MySQL database for ease of access.

Major Assignments

The major assignments were downloaded from each participant and stored in a password-protected online storage box, CyBox. These assignments serve as the link between theory and practice, as the participants attempt to transform declarative knowledge gained from the course into procedural knowledge. With this as a foundation, it can be observed how English language professionals from around the world incorporate, or would incorporate educational technology into their practices.

Quizzes

The quizzes show the immediate understanding of the content knowledge presented within the course. All quizzes are in the form of multiple choice questions and participants can freely access the course content while completing the quizzes. These are formative and independent of each other. In other words, they do not test cumulative knowledge gained throughout the course. As such, this data can only be viewed on an individual-skill basis. Even still, it can be helpful for the creators of the course to better understand where there are disconnects between intended learning outcomes and actual learning outcomes.

Canvas Messages

These provide yet another layer of the social interactions that participants may choose to engage in throughout the course. The only time participants are required to send Canvas messages (similar to emails, but only accessible in Canvas) is during the Week 5 major assignment, where participants must communicate with one another to complete the collaborative assignment. Other than this assignment, Canvas messages are not required in the course, yet some participants do send them and their purpose for doing so can be for a number of reasons including, but not limited to, requesting clarification on assignment instructions and TA feedback on assignments.

Data Analysis

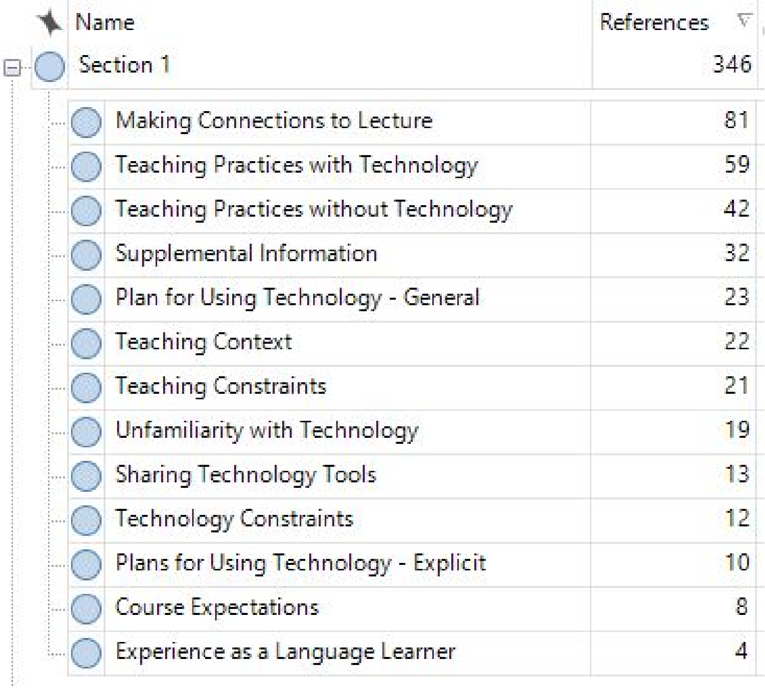
An initial thematic analysis was conducted using the discussion forums from the two sections in the Fall iterations. There were 19 participants that provided data from these two sections, resulting in 280 original posts (56,400 words) and 390 replies (23,622 words). The original posts were then thematically coded using Grounded Theory (Glaser & Strauss, 1967) using the participants' ideas as the unit of analysis. As the participants often connect ideas between sentences, this was thought to be the best way to fully capture the themes present in the discussion forums. Then four coders began by coding two samples taken from Weeks 1 and 2. The four coders then met and discussed their individual coding results. From this meeting, 13 themes were mutually agreed upon for specific coding. The remaining original posts were then coded using NVivo 12 with periodic meetings to ensure that the established themes were being coded. Replies were read through to gain a general understanding of the participants' ideas, but as the established themes were not being found in them, the replies were omitted from the thematic analysis.

After the initial thematic coding had been conducted, the four coders met again to select two participants at random--one from each section--to explore everything the participants had completed throughout the course. Between the two participants selected, additional data that was analyzed included four surveys, twelve major assignments, four reflections, and 64 replies. Using this data, the four coders developed Course Engagement Profiles for the two participants to explore how the course was being integrated into their teaching practices.

Initial Findings

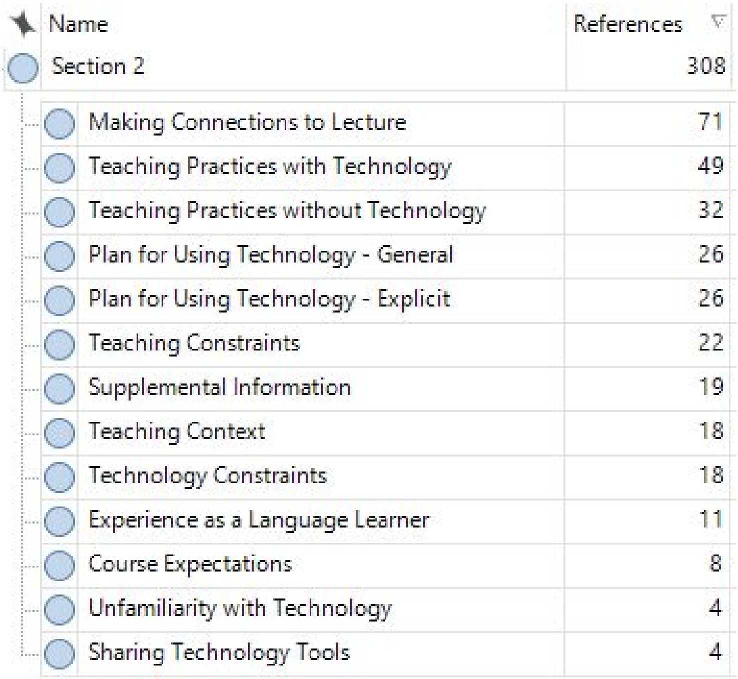
Preliminary findings based on thematic analyses have revealed a number of similarities and differences between participants throughout the two sections. First, regarding the discussion forums, there are 13 themes that arose when four coders went through the data (see Figures 6 and 7). The most dominant theme that arose, to no great surprise, was participants making connections to the lectures. This often came in the form of "We learned about X, which can be seen in my context Y." The participants would often expand on this by describing or explaining X within their particular teaching context. This connection between the lectures and current practices can best be described as contextualizing the decontextualized. As the participants come from a wide range of backgrounds, it is vital that the course content be decontextualized as much as possible so that everyone has the chance to apply it. If the participants were not engaging in this conversation, either the lectures are not effective, or the participants are not watching the lectures.

Figure 6. Emergent themes and respective coding of Section 1



Name	References
Section 1	346
Making Connections to Lecture	81
Teaching Practices with Technology	59
Teaching Practices without Technology	42
Supplemental Information	32
Plan for Using Technology - General	23
Teaching Context	22
Teaching Constraints	21
Unfamiliarity with Technology	19
Sharing Technology Tools	13
Technology Constraints	12
Plans for Using Technology - Explicit	10
Course Expectations	8
Experience as a Language Learner	4

Figure 7. Emergent themes and respective coding of Section 2



Name	References
Section 2	308
Making Connections to Lecture	71
Teaching Practices with Technology	49
Teaching Practices without Technology	32
Plan for Using Technology - General	26
Plan for Using Technology - Explicit	26
Teaching Constraints	22
Supplemental Information	19
Teaching Context	18
Technology Constraints	18
Experience as a Language Learner	11
Course Expectations	8
Unfamiliarity with Technology	4
Sharing Technology Tools	4

The second and third themes (*Teaching Practices with Technology* and *Teaching Practices without Technology*) are also not surprising and are related to one another. These were the instances where participants shared current teaching practices, with or without technology. Since most of the discussion prompts ask for this information, it was anticipated that there would be many references to these themes. The reason for this is to activate schema knowledge—to ensure the participants were thinking about their current teaching practices while engaging with the lectures. Therefore, what was seen was a co-occurrence of theme 1 with themes 2 and 3. This means, where themes 2 and 3 showed up, it was almost certain that theme 1 would follow.

After the first three themes that are ubiquitous throughout the data, the themes start to diverge in importance, as suggested by how different the number of references are for each. On a whole, plans for using technology (general) shows up quite regularly as four and fifth in frequency. What is meant by 'general', as opposed to 'explicit,' is that the participants made a general statement regarding their intended use of a technological tool (e.g., "*That is a great tool. I will surely use it in my classroom.*"). An 'explicit' plan for using technology includes the technological tool being included within a current teaching practice. This involves exact details on how and when, and for what skill, the participant would use the tool. As the above data show, the "explicit" version of the theme showed up sporadically. Other themes that were more predominant in some sections than others include providing supplemental information, unfamiliarity with technology, and sharing technology not provided in the course.

The final two themes which will be discussed here are the constraints, both in teaching and in using technology. Teaching constraints in general were mentioned more across the sections that constraints with using technology. This finding is not overly surprising, as an educator faced with severe limits on access to new technology would not take an 8-week course devoted to educational technology. However, the teaching constraints provided some interesting similarities among the participants, regardless of context. The most frequently identified constraint was class size. This seems to be a universal issue for teachers across the globe. This issue became more visible in discussion forums during the listening and speaking modules, where the ability to perceive and produce sound is crucial for development. Therefore, it is not surprising that most major assignments in those modules focus on self-directed learning or collaborative work with peers.

FUTURE RESEARCH DIRECTIONS

So far, the data has only been thematically analyzed to find similar and dissimilar themes among the participants of the different sections. For future studies, there are two major pathways in which the data will be analyzed. The first is the development of CEPs. Development of CEPs is well under way at the course section level, with a particular emphasis on discussion forums, quizzes, and major assignments. CEPs at the individual level have been started for select participants, though this is a very time-consuming process, as everything the participants produce throughout the course is collected and analyzed for details of their progress.

The second pathway for future research is the further categorization of participants into CoPs. The thematic analysis provided a clue as to what participants discuss in the forums in general, but what was not analyzed was who said what. That is, is there an observable pattern of thematic mentioning by participants? It is expected that certain differences would exist between those who teach at different levels (e.g., primary school vs. university), those who have different occupations, those who have different language proficiencies, and those who have different lengths of educational or teaching experience. By understanding these differences, future discussion forums can be structured to allow all participants to contribute equally.

Aside from these two pathways, the abundance of data collected through the many iterations of the course open opportunities for applied linguistics research. For example, emails exchanged through the Canvas messaging system can be used to conduct L2 pragmatics research. As has been mentioned, Canvas messages provide an additional layer of social interaction within the course which becomes integral in the completion of at least one major assignment, as students are required to collaborate with their course peers. Moreover, the messaging system allows communication between trainees and mentors/TAs as they look for guidance in completing their course assignments. Indeed, unlike MOOCs in which learning often takes place in isolation, the GOC *Using Educational Technology in the English Language Classroom* promotes engagement between trainees and mentors/TAs who serve as support systems, which has been shown to help establish a sense of community within the online course (Chang, 2004), improve retention rates (Truluck, 2007), and pushes trainees to be more critical and reflective in their learning (Homitz & Berge, 2008). Further research can be conducted on how interaction within the Canvas messaging system is conducted, specifically observations can be made regarding the connection between intended message purpose and the actual written message, and whether there are any discrepancies. For example, a trainee requesting help with their assignment may not make the request in a manner that mentors/TAs find appropriate. Such information can be useful in determining the type of support that trainees may need to communicate their intentions appropriately by email in order for them to be successful in an online course.

SOLUTIONS AND RECOMMENDATIONS

Finally, focusing on our three hurdles mentioned above, this last section will provide insights gained from instructing the GOC, as well as insights provided by participants in their major assignments, reflections, and discussion posts. To reiterate, the three hurdles that will be addressed here are (1) insufficient dissemination of information on effective teaching with technology, (2) insufficient methods for keeping track of emerging technologies for language learning, and (3) insufficient importance placed on usable technology in specific contexts. It is hoped that the experiences of both the GOC instructors and the English language professionals will shed light perhaps not on a specific answer but simply on a plan of action for future instructional technology developers.

Overcoming the First Hurdle

To overcome this first hurdle (i.e., dissemination of information), teachers need to be given a launching pad of sorts. In this analogy, the GOC plays the role of a launching pad. By providing teachers an opportunity not only to learn about effective use of technology in the classroom, but also by providing them with a means to practice integrating technology into language skills, the GOC provides both theoretical and practical knowledge for teachers to take and share with their colleagues. Even if that knowledge is simply that the course exists for those who want to learn more about integrating technology into the language classroom, it is certainly one way to jump this first hurdle.

However, this course alone cannot help all language teachers across the world to integrate technology effectively. In order to advance work in this area, a MOOC with the same title has also received a trial run (see https://www.canvas.net/browse/fhi/courses/using-ed-tech-in-el-classroom for a description of this MOOC). Also in development is a self-paced open course for individuals to access whenever they feel they have time to complete the training. Just as technological resources exist for language teachers to use in their classrooms, so to must we provide open, accessible resources for them to integrate those resources effectively. Simply by adding technology to the classroom does not equal a better educational experience.

Moving forward, educators must be provided with more contextualized courses developed for the use of technology in the language classroom. The GOC provides instruction which can be considered quite decontextualized, and then is contextualized by the trainees throughout the course in the form of discussions and major assignments. This is a useful starting point; however, by providing teachers with more contextualized instruction, it is believed that the training will be strengthened through its relevance and adaptability. Just as language learning should be contextualized, so too should the instruction that language teachers receive.

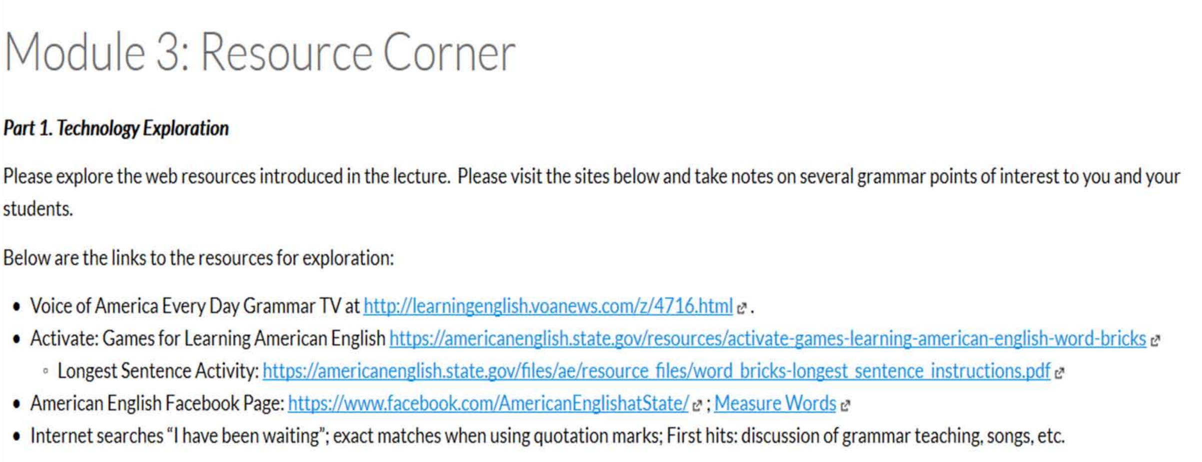
Overcoming the Second Hurdle

This is by-far the most time-consuming hurdle to overcome—keeping track of all the new technologies. This hurdle is further exacerbated by the fact that not all technologies provide 'good' language learning opportunities, even though their advertisements may suggest such. However, this hurdle may be easier to jump than previously thought. Just as the Google Playstore and Apple App Store allow users to leave reviews, language professionals must create a similar yet separate repository and review website. Relying on reviews left in large domains, such as Google Playstore, are often unreliable for teachers. The reasoning is quite simple: anyone can leave a review. What is needed is a verified website for language educators and researchers to leave reviews of technologies within specific teaching contexts.

This website would include professional reviews of these technologies that are explored by researchers. For example, academic journals such as CALICO Journal (https://journals.equinoxpub.com/CALICO/index) and Language Learning and Technology (https://www.lltjournal.org/) dedicate a section for language technology reviews that explore the application of new technologies to language teaching and language learning. The content of the verified website could be kept updated based on the professional reviews published in such journals as new tools, software, or websites for language learning emerge.

In January 2020, the GOC will start running its updated version, in which a section called 'Resource Corner' will be introduced. In this section of the GOC, the course participants will be provided with the URLs to websites that could be used to teach a specific language skill (see Figure 8).

Figure 8. A screenshot of Resource Corner page in Module 3 for grammar teaching



Module 3: Resource Corner

Part 1. Technology Exploration

Please explore the web resources introduced in the lecture. Please visit the sites below and take notes on several grammar points of interest to you and your students.

Below are the links to the resources for exploration:

- Voice of America Every Day Grammar TV at http://learningenglish.voanews.com/z/4716.html .
- Activate: Games for Learning American English https://americanenglish.state.gov/resources/activate-games-learning-american-english-word-bricks
    - Longest Sentence Activity: https://americanenglish.state.gov/files/ae/resource_files/word_bricks-longest_sentence_instructions.pdf
- American English Facebook Page: https://www.facebook.com/AmericanEnglishatState/ ; Measure Words
- Internet searches "I have been waiting"; exact matches when using quotation marks; First hits: discussion of grammar teaching, songs, etc.

The verified website would have such pages dedicated to each language skill and provide URLs, reviews, or video introductions of technologies that target these skills. While such content would create a repository, there would still be a need for validation or verification by language teachers. Therefore, in order to give educators an opportunity to share their first-hand experiences with these tools, a discussion forum in each page would be invaluable to observe how the presented tools could be integrated in actual classroom teaching.

Overcoming the Third Hurdle

We hope that our study of CEPs and CoPs can serve as a stepping stone for developing educational technology that can fit a variety of educational contexts and overcome a myriad of accessibility, cost, usefulness, and appropriateness issues. One possible avenue for such an endeavor is OERs. In parallel with the developments in information and communication technology (ICT), we have witnessed the popularity of e-learning in education, which facilitates easy access to educational resources for teachers and learners. Especially in the last decade, the idea of 'open' content or knowledge has flourished to provide an equal education opportunity for learners. OERs cover a wide range of pedagogical materials that "differ widely in scale, sophistication, and goals: online textbooks, supplementary exercises, lesson plans, language corpora, annotation tools, and so forth" (Blyth, 2013, p. 4). As such, OERs could be regarded as resources that are created for educational purposes available either in the public domain or freely available. In other words, it is a technology-enhanced movement in which educational content is created and shared worldwide (Caswell, Henson, Jensen, & Wiley, 2008).

Some OERs that have been created for the field of language education by professionals (e.g., project teams, course designers) are COERLL, FAVOR, and Humbox, or by language learners themselves such as Language Box (Whyte, Schmid, Thompson, & Oberhofer, 2014). The 'openness' of OERs can pave the way to addressing issues of accessibility, cost, usefulness, and appropriateness, thus helping language professionals to jump the third hurdle. While the physical availability of technology may still pose problems, with many OERs the only person who needs access to technology is the teacher. These ready-to-use materials often can be printed or stored for later use without needing a stable internet connection. This offline use of OERs is exactly what a lot of teachers in low- or mid-resource regions are looking for to use in their classrooms. Even where technology is readily available, contextual availability may still be an issue for some teachers, which in some cases goes as far as banning the use of technology in the classroom.

OERs, whether used online or offline, are certainly one pathway towards addressing the third hurdle, i.e., the digital divide. This is not to say that OERs are a cure-all, as the digital divide is a major issue, but by granting access to both the creation and dissemination of OERs, particularly those that can be used offline, we provide an opportunity for language maintenance, growth, and preservation to indigenous languages by reducing the necessity of technology within the classroom. The authors of this paper believe OERs in all their varying forms, from spoken and written corpora to ready-to-use materials, are how educators and researchers can begin to 'go out of their way,' as Warschauer (1997, 1998, 2012) and Chapelle (1997) asserted, in order to address the digital divide. However, further research is necessary to determine what, if any, effects the creation and dissemination of OERs has on the digital divide.

CONCLUSION

Moving forward, there is every indication that the role of technology in the language classroom will continue to grow as better tools and programs are developed. However, it is imperative that language educators are not left in the dark about these tools, both of their existence and of effective methods for utilizing them inside and outside the classroom. This chapter has explored three identified hurdles within the field, and how the use of a GOC in education technology can be used to jump most of the hurdles. However, there are still plenty of educators around the world who do not have access to this course, do not know the course exists, or simply refuse to accept the growing importance of technology within the language classroom. Therefore, it is up to educational technology developers to make sure their programs and tools are not only shared with the language education community, but also that they provide truthful and detailed guidance on how the tool could and should be used for language learning. OERs are one such route for the sharing of educational resources within this community, but much more work still needs to be done to ensure the effectiveness of teaching with them. In short, work has begun to spread effective methods for teaching with technology, as well as effective methods for sharing resources with the education community, and this line of work should continue to grow so that teachers and learners alike have the same access to language tools.

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KEY TERMS AND DEFINITIONS

Community of Practice: Any group of individuals who share a craft or profession.

Computer-Assisted Language Learning: The use of computer programs and applications to aid in the learning and teaching of languages.

Educational Technology: Any digital technology that has been designed with educational purposes in mind, primarily to facilitate learning.

e-Learning: Typically refers to the use of the internet to provide learning opportunities, such as online courses and video lectures.

Open Educational Resources: Educational resources that are freely accessible, adaptable, and distributable that can be in various file formats.

Technology-Enhanced Language Learning: The incorporation of any technology to support and enhance the learning and teaching of languages.

Techno-Pedagogy: The term used to refer to pedagogical practices and methods that include the integration of technology as a primary component.

Chapter 13

Promoting Interpersonal and Intercultural Communication With Flipgrid:

Design, Implementation, and Outcomes

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ABSTRACT

The chapter reports a Spanish-American intercultural exchange through which L2 learners used asynchronous video discussions to exchange cross-cultural perspectives. The study involved 37 university students who carried out CMC tasks over a 14-week period. Using quantitative and qualitative data collection, the study explored the affordances and challenges of using asynchronous video discussions for intercultural learning. Findings revealed that students demonstrated interpersonal communication skills and strategies to interact with their distant partners, and gained intercultural competence. The study suggests that a personal commitment to the online exchange is essential to maximize the potential of asynchronous CMC to promote active interaction. The study concludes with pedagogical implications for practitioners interested in implementing virtual exchange projects using video discussions to develop learners' interpersonal and intercultural communicative competence.

INTRODUCTION

According to the *ACTFL Performance Descriptors for Language Learning* (ACTFL, 2012), building interpersonal communication skills is essential for language learners to interact effectively with others. Interpersonal communication involves interpreting and producing the target language through negotiation of meaning within a variety of social contexts, such as in face-to-face communication or through social interaction mediated by digital technology. However, many students encounter challenges in developing communicative language competence[1] in the traditional classroom due to limited instructional time and

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large classes. Moreover, many students do not have the opportunity to use the target language (L2) in authentic communication beyond the classroom. Given that language exchanges generally take place between native speakers (NSs) of different cultural backgrounds, virtual exchanges supported by computer-mediated communication (CMC) afford invaluable opportunities for L2 learners to engage in genuine interaction through which they build language skills and intercultural competence (Dugartsyrenova & Sardegna, 2017; Lee, 2018; Schenker, 2012). Accordingly, different approaches and models have been implemented in L2 instruction to promote intercultural communication and L2 development. Efforts have been made to engage students in intercultural interaction and collaboration with partner classes from other cultural contexts (e.g., Canto, Jauregi & van den Bergh, 2013; Guth & Helm, 2010; Lee, 2017; Lee & Markey, 2014; O'Dowd & Lewis, 2016). Affordances of online intercultural exchange include linguistic gains (e.g., Çiftçi, 2016), pragmatic awareness (e.g., Chun, 2011), intercultural competence (e.g., Lee, 2012), and increased motivation and autonomy (Fuchs, Hauck, & Müller-Hartmann, 2012; Lee, 2011). Challenges have also been identified, such as different time zones for real-time interaction, limited access to the internet and lack of technological skills (Helm & Guth, 2010; O'Dowd, 2013).

As with the implementation of intercultural exchanges, researchers have highlighted the importance of instructional design, including learning objectives, task type, tool selection and strategies for assessing student performance (O'Dowd & Ware, 2009; Vinagre, 2017). Task-based instruction focusing on negotiation of meaning has been adopted for computer-assisted language learning (CALL), including virtual exchanges (e.g., Kurek & Müller-Hartmann, 2017; Lee, 2016; Levy & Stockwell, 2006; O'Dowd, 2013). As to digital tools, both synchronous (text chat, videoconferencing) and asynchronous (email, blog, forum) CMC have been implemented in intercultural exchange projects (e.g., Canto, Jauregi, & van den Bergh, 2013; Dugartsyrenova & Sardegna, 2017; Lee, 2014). In addition, social media (*Facebook*, *Twitter*) has become popular for informal communication outside of the exchange project (e.g., Jin, 2015; Liaw & English, 2013). Asynchronous text-based CMC has been commonly chosen because of its flexibility of time and space (Lee, 2009; Lee & Markey, 2014). Similar to asynchronous CMC, the video discussion platform, *Flipgrid* has been embraced by many educators to create a virtual learning space for students to interact and collaborate with others. Yet the design and use of asynchronous video discussions that promote intercultural communication and learning in the foreign language context is limited. Thus, the study aims to explore the affordances and challenges of the implementation of *Flipgrid* in a Spanish-American virtual exchange for the development of learners' interpersonal communication skills and cross-cultural perspectives. In particular, it examines the role of task, peer-to-peer interaction and other factors that influence student engagement, motivation and cross-cultural views.

REVIEW OF THE LITERATURE

Intercultural Competence and Virtual Exchange

In the context of L2 teaching, developing linguistic proficiency as the sole aim of language learning is no longer adequate for the need to interact with people from diverse backgrounds. Rather, today's climate demands that intercultural competence be an integral part of the language learning process (Lee, 2018; Moeller & Nugent, 2014). The goal of intercultural communication is to promote profound cultural learning through interpersonal process rather than presenting cultural facts. According to Byram (2012), L2 learners need to develop critical cultural awareness by using interpreting skills to explain and understand cross-cultural issues with curiosity and open-minded attitudes in order to gain intercultural perspectives. Ideally, learners would advance their personal discovery through social engagement that encourages them to reflect critically on their cultural similarities and differences, thereby deepening their cross-cultural understanding. To effectively achieve critical cultural awareness, it is crucial that learners be capable of evaluating, comparing and contrasting cultural products, practices and perspectives from both their own and other cultural points of view, without falling prey to cultural stereotypes and preconceived judgments (Houghton, 2013). Therefore, intercultural learning should focus on providing students with an enriching experience of interacting with people from other cultures with understanding and accepting them as individuals with values and distinctive perspectives (Byram, Gribkova, & Starkey, 2002, p. 10).

When face-to-face interaction with NSs is not possible, virtual exchange offers an effective means to foster cross-cultural communication. According to O'Dowd (2018), virtual exchange involves online interaction and collaboration between learners from different cultural backgrounds in geographically distant locations. The exchange is typically carried out over a period of time and facilitated by the instructor. To establish a successful intercultural exchange, CMC researchers have underscored the necessity of pedagogical knowledge along with technical expertise, including instructional goals, task design and selection of CMC tools (e.g., Kurek & Müller-Hartman, 2017; Lee, 2014; O'Dowd & Lewis, 2016). A number of virtual exchange projects for L2 learning have been established, such as *Cultura*, *Teletandem, INTENT* and *COIL Institute for Globally Networked Learning in the Humanities* (see O'Dowd, 2018 for more detail). Online exchanges and collaborations with NSs align well with sociocultural views of language learning, which promotes meaningful intercultural communication through social engagement (Lee, 2017). Research findings have shown that virtual exchange using CMC is an effective way to develop learners' language skills and intercultural competence (e.g., Angelova & Zhao, 2016; Chun, 2011; Lee, 2011; Rubin, 2016). For example, Ryshina-Pankova (2018) undertook a study of a Germany-US text chat exchange through which both groups discussed topics regarding national identity, national symbols, and sports for seven weeks. The study highlights the importance of using discourse analysis and linguistic form to understand intercultural communication and development. Another case study conducted by Chen and Yang (2016) revealed that online exchange using a wiki platform had a positive impact on the development of learners' cross-cultural understanding by moving them away from stereotypical perceptions. The process of analyzing and reñecting on native informants' perspectives enables students as outsiders to learn about the cultural framework governing the what, how and why of insiders' expressions in everyday interactions. Using a socio-cognitive approach, Lee (2017) reported an intercultural exchange project in which students used various types of digital tools (*Blogger, VoiceThread, Zoom*) to share cross-cultural perspectives with L1 speakers. Students demonstrated various stages of intercultural competence from understanding cultural differences to demonstrating attitudes of openness and appreciation for the target culture. In addition, peer feedback helped students increase lexical knowledge and prevent language fossilization.

Despite the positive effects of intercultural exchanges on the development of linguistic skills and intercultural competence, researchers have raised concerns about asynchronous CMC. Social presence is limited to asynchronous text-based interaction due to the lack of visual and vocal cues. Moreover, Basharina (2007) remarks that due to the time-consuming nature of writing and reading text-based posts, students become less motivated to take an active involvement in the exchange. As to asynchronous voiced-based CMC, Lee's (2018) study revealed that voice recordings via *VoiceThread* enabled learners to document their speaking performance over time, and teachers track the ongoing progress of their oral skills. Nevertheless, asynchronous oral posts may cause learner anxiety to produce output and allow others to understand one's voice without the help of body language. Furthermore, Hung (2011) pointed out that ESL students found the voice blogging less authentic due to the time delay in the exchange.

Asynchronous Video Communication for Foreign Language Learning

Baker (2016) underscores that asynchronous video communication creates an opportunity for collaborative learning through social interaction and enhance L2 learners' interpersonal communication skills. Asynchronous video communication offers several benefits for learning languages. Firstly, unlike real-time interaction, asynchronous video-based discussion provides a self-paced learning with the flexibility of time and space, and makes the learning more personalized (Moore & Filling, 2012). Secondly, students can view their performance as many times as needed. As a result, they become self-reflective and self-critical as they make self-evaluation of their performance and trace their improvements. Thirdly, students benefit from re-watching videos, and gain a deeper understanding of the content by taking time to think about a response before commenting. As noted by Griffiths & Graham (2009), video contains both verbal and non-verbal cues that exist in face-to-face interaction. Unlike text-based interaction, video supports non-verbal communication, including body language (e.g., facial expressions, gestures) and paralanguage (intonation, pitch, speed), which may help convey meaning and avoid misinterpretation. Communication via audio and video channels also helps students convey a feeling of closeness and reduce isolation (Clark, Strudler, & Grove, 2015). To this end, visual and vocal cues make establishing social presence easy and help create a greater sense of community (Borup, West, & Graham, 2012).

Most existing studies indicate that video recordings helped improve L2 learners' linguistic gains based on self-evaluations (Lin, 2015; Sun & Yang, 2015). For example, Castañeda and Rodrígues-Gonzáles (2011) reported a study using asynchronous video communication to enhance Spanish students' speaking skills. Students were asked to submit multiple drafts of digital video recordings and reflect on their own speaking performances using self-evaluation forms. The result shows that video recordings helped students improve their perceived speaking abilities. Another study of Göktürk (2016) examined the effectiveness of digital video recordings on speaking performance of EFL students. Although the sample size was small, only ten students, the results of pre- and post-tests suggest that after recording eight digital videos, students improved their oral fluency and gained self-confidence in speaking. More than 50% of the students encountered the difficulty conveying their ideas in a precise manner within the allotted amount of time. Additionally, they addressed concern about spending time uploading videos to *Facebook* due to the large size of the videos. It would be practical to record videos directly on a platform without having to upload them from a computer or a mobile device. Other challenges have also been reported in the literature, such as the discomfort of sharing recorded videos, and the time delay in responding and commenting on each other's videos (e.g., Keesler, 2018; Lee, 2016).

Given that little is known regarding how asynchronous video-based discussions influence cross-cultural communication in virtual learning environments, the study aims to fill a gap in CMC research on the effect of asynchronous video-based virtual exchange on the development of intercultural communication. The current research project presents an intercultural exchange project involving English and Spanish speaking students. In accordance with the socio-constructivist perspective to L2 learning, the study attempted to investigate how the use of asynchronous video discussions via *Flipgrid* affected the way in which students interacted and collaborated with their cross-cultural peers to build their interpersonal communication skills and intercultural competence. Further, the study offers a sound pedagogical understanding of how L2 learners use the opportunity offered by asynchronous video communication to engage in intercultural dialogue with NSs in ways that go beyond a superficial 'facts only' approach and promote in-depth intercultural learning.

METHODOLOGY

Context of the Study

The project was set up using one advanced Spanish class and one advanced English class in the spring of 2018. In general, students do not have the opportunity to use the target language to interact with NSs outside of class, as they live in small towns and cities with only native-language daily communication. The Spanish-American virtual exchange project was built into the course to afford students with increased opportunity to engage in authentic communication with NSs outside the classroom. The project was worth 30% of the final grade. The project involved 37 university students at the advanced level who carried out a variety of asynchronous CMC tasks over a 14-week period. Task-based activities were used to launch students into discussions about cross-cultural issues. Each task focused on meaningful exchange and real-world language use to achieve a true outcome. As to asynchronous communication tools, *Flipgrid* was chosen for the project because it allows students to create short videos and respond to each other's messages quickly and easily to build their speaking fluency. Students do not need to create an account to use *Flipgrid*. They can download the *Flipgrid App* to any device, including tablets and mobile phones connected to the Internet. It was hoped that the intercultural exchange project would create a learning community through which they could build interpersonal communication skills, and develop cross-cultural awareness and understanding. Students would take control of their own learning in constructing L2 knowledge, and hone their critical thinking skills through online social interaction.

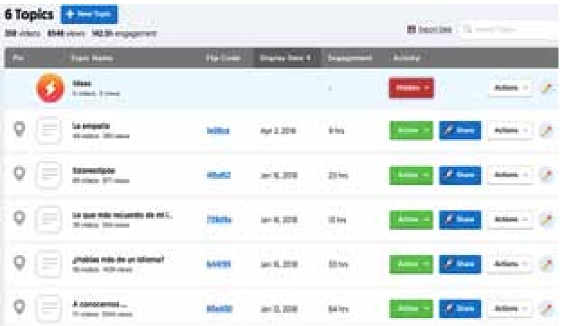
Participants

One advanced English class from a university in northern Spain and one advanced Spanish class from a large public university in the northeastern United States participated in the project. American students (N =12) taking the course "Introduction to Second Language Acquisition" and Spanish students (N =25) from the class "English for Translators and Interpreters" participated in the exchange. Student ages ranged from 19 to 24, with a total of 13 male students (35%) and 24 female students (65%). All American students were Spanish majors and had spent a minimum of one semester or one summer studying in a Spanish-speaking country, whereas not all Spanish students had studied or traveled abroad prior to the project. As to their language proficiency, both groups had sufficient command of the target language to interact with each other. The majority of the students were comfortable with digital media and social networking (e.g., *Facebook*, *Twitter*). Therefore, no training of using *Flipgrid* was necessary. Nevertheless, to cover all the bases, students were instructed to use *YouTube* tutorial videos and online help sites for assistance as needed, and the instructors were also available to help students with technical needs.

Procedure

Prior to the project, the two instructors coordinated the logistics of the exchange and decided what types of tasks would be used for students to carry out the exchange. Their roles were primarily as facilitators of monitoring the project, including reminding students of task deadlines and ensuring students' active involvement with the exchange. To host and organize the exchange activities, the researcher, who was also one of the instructors, set up a private class known as a grid using *Flipgrid*[2] (free version) prior to the exchange. By using the "New Topic" feature, a collection of topics was created for the intercultural exchange project (see Figure 1).

Figure 1. A screenshot of topics created in Flipgrid



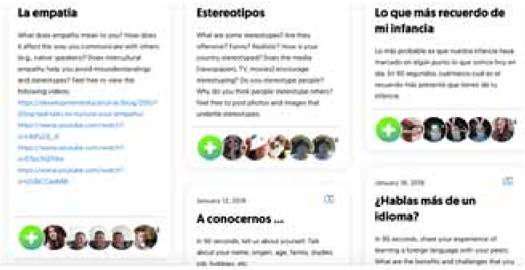
Students were informed about the project via *Canvas*[3] (US group) and e-mail (Spanish group). Both groups received the same general instructions to carry out each task, which required them to address various aspects of the topic and respond to their NS partners' videos (see Table 1).

Table 1. Samples of video discussion tasks for intercultural exchange project

Task	Description of Task
• #1 Getting to know each other	• For this assignment, you will record a 90 second video in the target language to introduce yourself to your distant partners. You should talk about your personal interests, family, academic work and future plans. Feel free to use selfies and stickers to personalize your recording. Be sure to watch your partners' videos and respond to them.
• #2 Sharing opinions about language learning and teaching in your country	• In 90 seconds, share your experience of learning a foreign language with your peers. What are the benefits and challenges that you have encountered in learning Spanish, English, or other languages? Also talk about various aspects of foreign language teaching and learning in your country. Make sure that you use external resources, such as videos or URLs to support your responses to your distant partners.
• #3 Discussing typical cultural stereotypes portrayed in your country:	• For this assignment, you will produce a video to address the following questions: What are some stereotypes? Are they offensive? Funny? Realistic? How is your country stereotyped? Does the media (newspapers, TV, movies) encourage stereotyping? Do you stereotype people? Why do you think people stereotype others? Feel free to post photos and images that underline stereotypes. Be sure to view and respond to your partners' video posts in *Flipgrid*.
• #4 Discussing empathy:	• According to *Wikipedia* (https://en.wikipedia.org/wiki/Empathy), the word "empathy" is the capacity to understand or feel what another person is experiencing from within their frame of reference. What does empathy mean to you? How does it affect the way you communicate with others (e.g., native speakers)? Does intercultural empathy help you avoid misunderstandings and stereotypes? View the following videos before you make your own recording. https://www.youtube.com/watch?v=s4dfy22j_IE https://developmenteducation.ie/blog/2015/10/top-ted-talks-to-nurture-your-empathy/ https://www.youtube.com/watch?v=07ps7ttZFWc

For each video task, speaking prompts along with online resources were used to guide the discussion (see Figure 2). Students had approximately two to three weeks to complete each task.

Figure 2. A screenshot of video discussion topics and questions



La empatía

Estereotipos

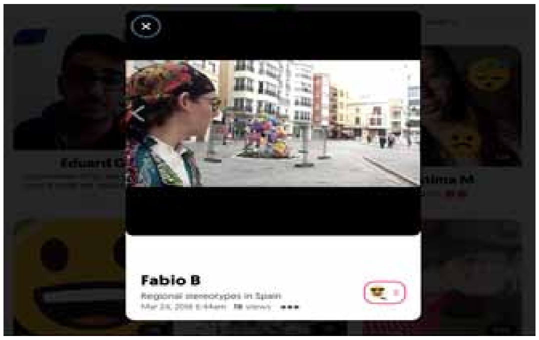
Lo que más recuerdo de mi infancia

A conocernos ...

¿Hablas más de un idioma?

After receiving the flip code or link of each topic, students worked independently to create their own videos. They were able to re-do their recordings as needed before they published them for viewing and commenting (see Figure 3).

Figure 3. A screenshot of the interface of video recording

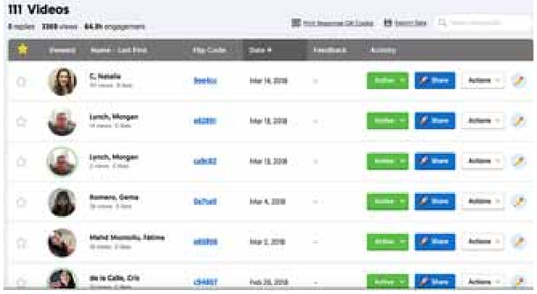


Fabio B

Regional stereotypes in Spain

Students then watched and responded to their peers' video postings by clicking on the name of the student (see Figure 4).

Figure 4. A screenshot of recorded video responses posted by students



111 Videos

To boost student interaction, the instructors monitored the exchange, reminded students of due dates, and encouraged them to participate fully in the exchange. The instructors also assisted students as needed with recording assignments and technical problems throughout the project. However, they did not participate in video discussions.

In accordance with the typical stages followed for an intercultural exchange as proposed by CMC researchers (e.g., Lee, 2014; O'Dowd & Ware, 2009), students first posted a video introducing themselves to their NS partners (see Table 1, Task #1). After the first recording, students used email or *WhatsApp* (https://www.whatsapp.com) to get acquainted with one another. Many spent approximately a week texting back and forth to talk about their personal interests and their academic work with each other. Next, students made videos to share their thoughts about learning and teaching foreign languages in their country[4] (Task #2). Another assignment was to discuss typical stereotypes of the target culture and their own culture (Task #3). To make observations about cultural empathy (Task #4), students first viewed the videos, read the web pages posted by the instructor, creates brief videos and posted them in *Flipgrid*. As most students had studied and/or travelled abroad prior to the project, they used examples from their own experiences of dealing with people from other cultures to support their viewpoints. They were encouraged to add websites, pictures and *YouTube* videos to their video recordings to support their responses. As a final step, students were asked to provide linguistic feedback to their NS partners to further their language development. To ensure equal practice of both listening and speaking in the target language with NSs, they were instructed to make videos in L2 but respond to their peers' video posts and give linguistic feedback in either L1 or L2.

Upon the completion of the exchange, American students met with the researcher for a follow-up interview during the final week of the class. Due to scheduling constraints, Spanish students were unavailable for interviews. Interview focus groups of 3-4 students met with the instructor to explore their observations about the intercultural exchange project. Open-ended questions were employed to solicit responses about students' experiences of using asynchronous video discussions for the virtual exchange, including learning gains and challenges in the project. The following questions were used to guide focus group interviews:

1. How satisfied were you with the virtual exchange project? Briefly describe your experience with the project.
2. In your view, what are the affordances and challenges of using video discussions for intercultural communication?
3. Was the use of *Flipgrid* beneficial to you? Did you find tasks and topics appealing? Briefly explain.
4. Did you find peer comments informative and useful? Why or why not?
5. Do you have additional comments or suggestions you would like to share?

All interviews were recorded digitally for data analysis. Each interview lasted approximately 30 minutes.

Data Collection and Analysis

Qualitative and quantitative data were gathered from multiple sources. Online surveys were created using *SurveyMonkey*. The online survey, consisting of a set of statements, used a 5-point Likert scale ranging from Strongly Disagree to Strongly Agree to gauge different viewpoints. Students indicated their level of satisfaction by ranking the statements from 1-5 (5 was the highest score). Video discussions allowed the researcher "to offer rich descriptions of observed phenomena, and to address issues related to participants' individual perspectives as well as to their personal life experiences" (Wang & Vásquez, 2012, p. 422). Qualitative analysis was undertaken by means of content analysis. Coding categories were derived directly from video discussions. The researcher first read and then identified common phrases, themes and key patterns concerning the affordances of the exchange for the development of cross-cultural perspectives and interpersonal communication, and the effectiveness of task type, *Flipgrid* and peer feedback. The most frequently used key points provided additional evidence to illustrate and support the findings on the exchange. Student observations about the virtual exchange drawn from the focus group interviews were used to provide additional evidence to support and justify the findings.

FINDINGS AND DISCUSSION

Effectiveness of Asynchronous Video Discussions for Intercultural Exchange

As seen in Table 2, 82% of the students enjoyed the virtual exchange with the NSs from Spain. In addition, many students enjoyed using *Flipgrid* videos for the intercultural exchange. For example, one student described her experience during the final interview (Statement 1):

For me, the best part of this exchange was to speak Spanish for a real purpose. I had never participated in this kind of exchange before this class. It was a lot of fun. Although it was quite time consuming, I enjoyed making videos for Spanish students and received useful comments from them. It was a worthwhile experience. I would do it again.

Table 2. Students' reactions to the intercultural exchange

Statements from the Survey	*Mean*	*SD*
1. Overall, I had a positive experience with the exchange.	4.10	0.35
2. I enjoyed making videos for my NS partners.	4.01	0.58
3. NS partners' videos were interesting and informative.	4.27	0.44
4. Participating in video discussions was beneficial for me.	3.86	0.77
5. I gained intercultural communication skills and knowledge through the exchange.	3.83	0.52
6. Interacting with my NS partners enabled me to gain valuable insights into the target culture.	4.04	0.61
7. Reflecting upon the NS responses/comments helped me better understand my own culture.	3.58	0.41

More than 80% of the students found NS videos appealing and engaging. During the final interview, students repeatedly commented on how much they liked the way their NS peers incorporated real life scenarios into their video recordings. For example, one student said (Statement 2):

The videos made by some Spanish students were amazing. They didn't just capture talking heads but recorded scenes from streets, neighborhoods and the university campus. It was really cool to learn about *the Spanish daily lifestyle discussed in the videos with a touch of authenticity. I think it was an excellent way to connect and interact with your audience.*

Another student commented on how much she had learned from viewing the NSs' authentic cultural videos (Statement 3):

I enjoyed so much watching the videos made by our Spanish partners. The one I liked the most was the video about the Fallas in Valencia. When I was in Granada last year, I didn't travel to Valencia to see the Fallas because I didn't want to miss classes. It was very interesting to learn about the origin of the Fallas, and see street parties and parades with large crowds. After watching the video, I had mixed feelings about the celebration. It seems dangerous to be around fireworks and firecrackers thrown on you…

The above comment clearly show that the American student valued the opportunity to learn about the target culture from the original and authentic videos made by their Spanish peers. As a result, more than 70% of the students agreed that they benefited from participating in video discussions and gained first-hand knowledge about different cultural perspectives. For many students, being able to practice their Spanish with NSs through *Flipgrid* video discussions is of great benefit for them. A similar finding was reported in the study of Lee (2017) indicating that students were in favor of participating in the virtual exchange to stay connected with the culture in which they were immersed, and continue their intercultural learning after sojourn abroad.

As might be expected, not every student felt comfortable participating in video discussions. A few students ($N = 3$) found the exchange intimidating and they expressed their discomfort using video recordings. One student voiced her concern during the final interview (Statement 4):

I'm a private and shy person. I don't like social networking. I don't even have a Facebook account. While I understand the purpose of this exchange, I'm concerned about private issues. I just don't think online communication is the best way to learn a foreign language. I prefer to interact with people face-to-face not through the use of computer.

It is likely that the student felt less motivated to participate in the online exchange due to her personal learning style and preference, as suggested by Lee (2016). Another challenge found in the study was the lack of active involvement with the exchange. One student expressed her disappointment about the exchange (Statement 5):

I'm a high school teacher and I work full time. I had a hard time keeping up assignments. I had no idea of how demanding the exchange was. I was overwhelmed by the amount of time I had to spend creating and responding to videos. I was frustrated by not being able to complete some of the recordings due to my busy work schedule. Also I'm a fluent speaker and I didn't find the exchange project beneficial. To be honest, I wish we had the option to not take part in this project.

It appears that this student had different expectations and goals for her own learning. Online exchange invariably requires students to have a degree of self-discipline and self-motivation. The finding suggests that the lack of time commitment on the part of the student contributed to her poor performance in the exchange. It would be useful to teach students self-management and self-monitoring strategies to increase learner autonomy, as suggested by Lai (2017) and Ranalli (2012).

Intercultural Competence through Video Discussions of Stereotypes

Overall, students demonstrated their intercultural competence by using their knowledge and skills to discuss popular culture, culture norms and values with their NS partners. A closer look at the readily available asynchronous discussions in *Flipgrid* revealed that both groups were aware of popular stereotypes[5], as displayed in Table 3. They participated in culture-centered debates on typical American and Spanish stereotypes about food, sports, religion, life styles and more.

Table 3. Common stereotypes perceived by American and Spanish students

Topics	American Stereotypes (US)	Spanish Stereotypes (Spain)
• Sports and dance	• Football, black players, square dancing, hip hop and tap dance	• Soccer, bullfighting, fans, flamenco, Gypsies
• Eating habits and food	• Fast and unhealthy food, eat from plastic dishes, a lot of meat, doggy bags, fries, sodas, hamburgers, donuts, overweight and obesity	• Paella, ham, tapas, sangria, gazpacho, a lot of wine, healthy diet, big lunch and take naps.
• Life styles, value and religion	• Materialism, rich, economic value, a lot of credit cards; obsessed with work, freedom of religion	• Partying, lazy, enjoying beaches, laid back, drinking a lot, not working hard, very religious
• Ideas and images of others	• Individualistic, patriotic, racist, gun-loving, ignorant	• Family-oriented, sociable, loud and noisy, tardy, affectionate

Although the current study did not attempt to measure students' progress in the development of intercultural competence, the majority of the students acknowledged that they gained communication skills and cultural knowledge through the exchange. Similar to the previous research findings (Lee, 2018; O'Dowd & Ware, 2009), asynchronous video discussions afforded students the opportunity to reflect on their thoughts to express their own cultural perspectives. For example, one student expressed his opinion about materialism in the U.S. to respond to his NS peer (Statement 6 translated from Spanish to English):

Hi! Eduardo. I would agree with you that Americans tend to judge things by their economic values and some Americans are too materialistic. But don't you think everyone is materialistic to a certain degree? I think people find happiness with precious material things. For example, I would buy stone-made jewelry not because I need it but because I admire the artwork is created. I feel that the money is well spent on a beautiful piece of art and craft. I hope this makes sense to you. Have a nice day.

Other findings show that students exhibited their ability to express curiosity about other cultures, and to compare and contrast cultural differences, which are important attributes in intercultural competence described by Byram (1997). Although most American students had spent one semester studying in Granada and were familiar with the local culture of the southeast part of Spain, they expressed a keen interest in learning other parts of the Spanish culture, such as the region of Catalonia. For example, this student showed her curiosity about Catalan cuisine by asking her Spanish partner a follow-up question:

"What is fideua? You said that it's different from the typical paella in your video. I'm curious to know…" Another student responded to one of the American students: "You mentioned that you studied and lived in Granada. What do you think about the Andalusia culture? Did you like flamenco?" The questions show that the students were motivated to seek more information on the cultural perspective of their NS partners. As another example, one student explained her point of view about taking a nap (Statement 7):

Hi, Fátima. First of all, thanks for your feedback. I didn't know that Spaniards take a siesta to avoid the mid-day heat and enjoy the late night lifestyle. I did notice that the siesta is kind of part of the culture there but it's more like a break than a nap. Hmm… some of the business would close and you wouldn't be able to go anywhere for a few hours. I think that's why it's so different for Americans to experience that because our society is go, go, go for the time. I mean that we don't stop working. Things are open all day long and I think it's odd for us to see that you guys take a break from the day and you slow down a little bit before the evening…Thanks for listening. Bye!

The above video comment shows that the student shared cultural differences about taking a nap with her NS partner and gained insights into the target culture. The student's reaction is in line with the findings reported in the study of Elola and Oskoz (2008) and Lee and Markey (2014) indicating that intercultural exchange enabled students to demonstrate their ability to compare and contrast the two cultures, which is fundamental for the development of intercultural competence.

More than 70% of the students acknowledged that peer comments helped them reflect upon their own culture and develop a greater self-awareness regarding their own beliefs. Video discussions encouraged students to re-consider their own values and beliefs. For example, one Spanish student responded to her American partner who seemed upset about the false stereotype of gun culture in the United States (Statement 8):

I'm sorry. I didn't mean to be offensive. Here in Spain the regulation of guns is highly restrictive and we don't own guns. I've read so much about mass shootings and innocent people got killed. One report said that Americans own 40% of all guns in the world. I was shocked when I read it. It seems to me that gun rights are about keeping white man in control… Also people with a mental illness are at risk for gun violence. I appreciate your letting me know that was not the case. I agree with you. Gun-related crimes involving low-income people, racial and ethnic minorities are framed with the media, which plays a stereotypical portrayal of gun violence.

The comment displays that the student used her skill to recognize her own perceptions of the generalizations shown in the media and her willingness to making changes in her beliefs, which is a key step in development of intercultural competence (Lee, 2018).

The result also shows students' ability to discover and acquire new cultural knowledge by interacting with his NS partner, as illustrated in the following (Statement 9):

Very cool. I did not know that Sardana is the traditional dance of Catalonia. I've always thought that most people in Spain dance flamenco and are proud of this traditional dance. It also seems that when foreign people visit Spain, they all want to see a flamenco show. I'll make sure to check out the link you included in your video. Thanks for the video link. I've realized that there is so much to learn about the culture of Spain. I've only had the experience with the culture of Andalusia.

As a result, the student gained new knowledge about the Catalonian culture and further expressed his interest in learning more about the typical dance of Barcelona. The study clearly demonstrates that the virtual exchange afforded students the opportunity to use their knowledge and skills to better understand each other's cultures, and gained cross-cultural perspectives.

Interpersonal Communication Skills through Social Interaction

Despite the fact that advanced students still made linguistic errors, most students were confident in using the target language to interact with their NS partners. They communicated with their partners using appropriate social and interpersonal skills during the exchange. In addition to the proper use of body language while interacting with NSs, students demonstrated their ability to negotiate for meaning by asking reflective questions, such as "Why do you think American people are materialistic?" and "Can you tell me what a Jewish person looks like in the United States?" Pragmatically, students expressed themselves appropriately during social engagements, which are often challenging for L2 learners to develop in the traditional classroom setting. In many instances, advanced students were aware of using speech acts, such as compliments, politeness and apology to diminish intimidation and save face or reduce social tension, as shown in the following video comments (Statements 10 and 11):

In your video you said that you are Jewish. I'm interested in this topic. I would appreciate it if you could record a video and tell me a little more about American Jews in the U.S. I've heard that most of them live in NY. Do they still keep their traditional celebrations?

Very interesting! It's an obvious stereotype but it exits. I like your video a lot. I think what you've said is somewhat true in the south of the United States. As far as the diet goes, we have one of the most expensive healthcare systems in the world yet we have one of the highest disease rates in the world; very interesting. I like your video lot. Have a great day!

As seen in above comments, one student used the conditional verb form to make a request and convey politeness, whereas another student used the word 'interesting' twice to give compliment to the points made by her NS peer. On the other hand, American students tended to overuse the expression 'lo siento' (I'm sorry for something bad that happened) as a politeness strategy. In most cases, they used 'lo siento' to apologize about making a mistake or saying something incorrect instead of using 'perdón' or 'disculpa' (sorry or excuse me), which indicates that they did not fully understand the appropriate use of the apology speech act in Spanish. L2 learners should pay attention to all relevant pragmatic choices used by NSs to develop their sociolinguistic competence that is vital to effective cross-cultural communication, as suggested by Lee (2017).

Effects of Task Design, Digital Tool and Peer Feedback

As illustrated in Table 4 below, students found tasks interesting and engaging. Students especially enjoyed discussing the tasks concerning controversial and diversity-related topics, such as bullfighting and religion. One of the topics receiving more than 25 hours of engagement was the discussion about stereotypes. Cross-cultural discussions reveal that students were aware of popular stereotypes and participated actively in debates on typical American and Spanish stereotypes about food, music, sports, religion, life styles and more (see Table 3). Moreover, both groups of students discussed stereotypical views of the target and host cultures by adding other resources, such as *YouTube* videos, photos and websites to their videos to support their viewpoints, as shown in the following video comment (Statement 12):

I enjoyed watching your videos about the debate on drinking habits and alcohol consumption in Spain. The article of El País about abuse Spaniards' alcohol use was quite interesting. I was surprised to learn that the alcohol in Spain comes in a twice the world average and higher than in Europe. When I was in Granada, Spain, my host mom told me that young people usually get together, drink and get drunk. It's called botellón and it's common to have a botellón before going out for party… So do you think Spain is an alcoholic society?

It also appears that they enjoyed topics concerning aspects of daily life. It is possible that students who had returned from abroad were more familiar with typical Spanish traditions and customs. Thus, they were more motivated to learn about lifestyles of everyday people. These findings are in line with those of the previous research affirming that topics of interest play a key role in promoting active engagement in intercultural learning (Lee & Markey 2014; O'Dowd & Ware, 2009).

Table 4. Students' reactions to tasks, digital tool and peer feedback

Statements from the Survey	*Mean*	*SD*
8. Tasks were appropriate and stimulating for intercultural exchange.	4.21	0.73
9. The use of *Flipgrid* was efficient and effective for the online exchange.	4.45	0.45
10. I benefited from receiving linguistic feedback from my NS partners.	4.11	0.52

With respect to the digital platform, overwhelmingly, nearly 90% of the students expressed their satisfaction and the perceived value of using *Flipgrid* by producing substantial cross-cultural exchange in this medium. A few students made the following observations during the final interview (Statements 13, 14 and 15):

The intuitive nature of Flipgrid makes it very easy to create video discussions. No usernames and passwords are required to use Flipgrid. You can also download the app and use it on the go. I love it.

I've never used Flipgrid before. It's incredibly easy to use. I absolutely loved the fact that I could record my videos as many times as possible before I published them. I think it's a great way to practice speaking.

The flexibility of asynchronous video discussions gave me additional time to reflect on the context so I was able to give more thoughtful responses. I also think in real-time communication some students may dominate the discussion. Flipgrid allows a more equal shared discussion so everyone has a voice.

Many students found video discussions to be superior to text-based communication because they were able to use paralinguistic cues, such as facial expression, intonation and gestures to help convey meaning and avoid misunderstanding. Several students pointed out that video discussions brought them close to their distant partners, and they learned how to communicate with NSs, which helped them become more interculturally competent. Moreover, the finding appears to suggest that shy students were more involved in online discussions than in class-based discussions.

A few drawbacks were reported, such as the limited recording time. The free version of *Flipgrid* has a 90 second limit, which presented a challenge for students because some topics would require more extended responses and discussions. As a result, some students posted multiple videos for each task. Another limitation is that *Flipgrid* allows students to post new responses but does not enable them to reply to the responses of their peers. To make comments on peers' videos, students would need to create new videos, which did not appear as engaging and interactive as possible for students. In addition, a few students remarked that they did not feel comfortable recording their voices and commenting on their peers' videos. Consequently, they did not participate actively in video discussions. The low level of social presence may contribute to the lack of confidence in speaking the target language. Others admitted that they procrastinated and fell behind with the exchange, and submitted their video responses and comments late causing the delay of video discussions. The finding is consistent with the previous CMC findings shown in the study of Lee (2016) that students with the low self-regulation may not benefit from social interaction with others.

As to linguistic feedback, more than 50% of the students enjoyed the interaction with their peers by making linguistic feedback on each other's video posts. Records from students' interviews show that they valued linguistic feedback received from NSs. One student said during the interview (Statement 16):

I am very thankful to our native speaker partners for their linguistic feedback on my grammar and vocabulary. Now I understand better the difference between "moverse" and "mudarse" (to move). I also have difficulty with the object pronoun usage. I often get confused with 'lo' and 'le' and the way Natalia explained was clear and easy to understand.

Video comments revealed that students received effective feedback from their peers, as illustrated in the following examples (Statements 17 and 18):

Pablo, I have to tell you that your English is very good. You also know how to maintain a good conversation and you have a good level of vocabulary. You only made a few minor mistakes. For example, we say to make not to do an effort. Also in Spanish you would say la gente like people is friendly but in English people is plural so we say people are friendly . . .

I love your accent, Tim. You speak like us with a Castilian Spanish accent. Your pronunciation is excellent. I can hardly find any mistakes. The only thing I would suggest is to use more articles. Also for a tricky one; it's el agua not la agua and agua sucia not agua sucio. I think this is a common mistake for a lot of people. Good job! Well-done!

The results show that most students were comfortable addressing their partners' linguistic problems. It is possible that their previous experience while abroad with L1 speakers lessened the potential anxiety of speaking L2 with their peers. The findings suggest that peer feedback helped students gain lexical knowledge, prevent language fossilization, and acquire more authentic discourse.

LIMITATIONS AND FUTURE RESEARCH

Many more studies are still needed to fully understand the impact of using asynchronous video discussions for intercultural exchanges. The study resulted in a sample size of 37 participants. For the purpose of the study, the sample size was adequate. However, a larger sample size, including learners from other Spanish-speaking countries and of other levels of L2 proficiency would add greater validity to the data to determine how language proficiency and native speaker country of origin would affect learning outcomes. Also, the findings of this study underscore the need for further investigation of learners' intercultural perspectives using other digital tools for assessment, such as real time video chats (e.g., *Zoom*, *Google Hangouts*). Adding pre- and post-surveys designed to measure students' attitudes toward the target culture and the beliefs of their own culture could also provide important insights into the effect of the virtual exchange on their intercultural learning. Finally, asynchronous video-based virtual exchanges involving less-commonly taught languages, such as Arabic, Chinese and Portuguese language learners would be worthwhile to explore in order to understand learners' intercultural behaviors, and linguistic and cultural gains within other cultural contexts.

PEDAGOGICAL IMPLICATIONS AND CONCLUSION

The study explored the effectiveness of using a virtual exchange in conjunction with asynchronous video discussions on the development of L2 learners' intercultural communication skills and knowledge. While the exchange mediated by asynchronous CMC and its benefits on learners' intercultural learning is limited in scope and depth, the findings of this study are significant. Students demonstrated various stages of intercultural competence described by Byram (1997) during the exchange with L2 speakers. Students showed curiosity and interest in the target culture, and reflected on their own culture by asking questions and expressing thoughts and opinions, which demonstrated important aspects of intercultural competence. Additionally, students became aware of how to interact with others appropriately in social engagements by using proper pragmatic skills to soften face-threatening acts, such as apologies, requests and compliments. As an additional benefit, linguistic feedback received from NS experts helped L2 learners gain lexical knowledge and improve linguistic accuracy.

The findings are noteworthy and point to the following pedagogical implications. Firstly, task-based learning is useful for students to actively engage in the exchange through the use of both tangible and intangible cultural topics (Lee, 2011). Secondly, the use of synchronous video discussions proves to be effective in empowering students to engage in intercultural communication. Thirdly, virtual exchange with L1 speakers exposes students to firsthand cultural observations and a wide range of functional language discourse within social contexts. Fourthly, asynchronous CMC allows students to establish interpersonal relationships and build a virtual learning community that fosters cross-cultural communication in an authentic and meaningful way. Finally, affective support from L1 speakers through empathy –the ability to put oneself into another's shoes –is indispensable to motivate students to fully engage in the process of negotiation of meaning during online exchange.

To conclude, the virtual exchange was successful from the students' perspectives and provided valuable insight into how L2 educators can implement online exchange projects in their classes to expand and continue to develop students' interpersonal communication skills and critical reflection on the content (e.g., cultural products, perspectives). As underlined by Lee (2016), technology does not promote learning on its own. Rather, the effectiveness lies in the way tasks were designed and carried out within the framework of the objectives of the project. Most of the students acknowledged that they would not have gained such in-deep cultural understanding without the intercultural exchange component of the class. Today's tech-savvy students are familiar and comfortable with all kinds of digital technology, including video communication. L2 educators should make every effort to integrate authentic interaction options into their classroom curriculum to assist further students' intercultural competence gains like the use of virtual exchange along with the affordable *Flipgrid* video platform.

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KEY TERMS AND DEFINITIONS

Asynchronous Video Communication: Audio and video communication between remote parties takes place without the requirement of being present in real time.

Intercultural Competence: It refers to the ability to demonstrate targeted knowledge, skills and attitudes that lead to effective and appropriate communication with people of other cultures.

Peer Feedback: Comments made by other students with an intention of bringing learners' attention to focus on form, such as grammar features. Peer feedback provides the opportunity for students to learn from each other.

Virtual Exchange: A type of educational project uses technology to allow people from different cultural backgrounds to interact and communicate at a distance.

ENDNOTES

[1] According to Canale and Swain (1980), communicative language competence is made up of four components: grammatical competence, sociolinguistic competence, discourse competence and strategic competence.

[2] The free version of the *Flipgrid* only allows 90 second responses. Thus, students were encouraged to provide key ideas with succinctness.

[3] *Canvas* is a cloud-based Learning Management System that is used by the researcher's institution. Students were familiar with the open source platform because they had taken courses via *Canvas* prior to the study. *Flipgrid* was embedded into *Canvas* to provide easy access to students.

[4] It should be noted that most Spanish students learned their first foreign language at young age and a few of them speak multiple languages.

[5] Stereotypes were chosen because they displayed a fair amount of students' attitudes, knowledge and skills as evidence of their intercultural competence.

Chapter 14

Data-Driven Learning at the English Drafting Stage

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ABSTRACT

Integrating corpus consultation to help students' re-use of vocabulary items for essay-drafting has not been sufficiently examined in instructional contexts. This chapter investigated the linguistic features of target words for which students consulted concordance programs to include in essays by documenting the DDL of three groups of EFL students in a Taiwanese college writing program. Participant essays, video files of consultation processes, responses to questionnaires, interviews, and written records of corpus consultation were examined. Researchers found 88.14% of all consulted words were incorporated into essays, with learners looking up 3.18 words. The lexical profile of consulted words indicates that learners mainly used the most common 1,000 to 2,000 words with more verbs more frequently consulted than nouns. Students queried words for confirmation or incorporated the discovered vocabulary into essays. As emergent pattern hunters, the participants made only limited use of dictionaries and bilingual resources. Implications of the findings are discussed.

INTRODUCTION

Recent years have seen corpora and concordance programs as significant resources for general foreign language (FL) learning and teaching and as practical references for writing in particular. Corpora are formed with a large amount of textual data of language (recent developments include multilingual and multimodal corpora). Many publishers of dictionaries or textbooks advocate the use of corpora for editing and compiling of their products. Those approaches are usually grouped as indirect use of the language corpora. Data-driven learning (DDL, Johns, 1991), that is direct corpus use by learners to acquire linguistic features, is shown to enhance various aspects of language acquisition (Boulton & Cobb,

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2017; Chen & Flowerdew, 2018; Crosthwaite, 2019; Pérez-Paredes, 2019). This is also known as learner concordancing (e.g., Liou, 2019). Under DDL, learners have direct access to computer programs with one or several corpora for consultation of lexical-grammatical features, which are called concordancers. Learners with such self-directed methods of observing a great amount of language input are expected to become researchers with inductive abilities of drawing patterns from careful analyses. On the other hand, dictionary users usually view no or a limited set of examples for headword entries but consult them mainly to obtain a sense of meaning. Research showed that a variety of corpus systems were exploited by learners for writing to enhance writing ability (Chen & Flowerdew, 2018). FL learners used concordancers not only for discovering unknown vocabulary while writing but also for error correction (Crosthwaite, 2017; Dolgova & Mueller, 2019; Liou, 2019) or other purposes.

Chen and Flowerdew (2018) examined 37 studies concerning using corpora to assist academic writing instruction. Few of them discussed the literature on using DDL for drafting in the pre-writing stage. The above authors assert that its development is still at an exploratory stage. To illustrate, corpus consultation has been observed and examined in assisting different aspects of writing: cultivating learners' efficacy in drafting (Kennedy & Miceli, 2017; Wu, in press), revising errors (Crosthwaite, 2017; Dolgova & Mueller, 2019; Liou, 2019), or enhancing writing abilities (Cotos, 2014; Huang, 2014). Concordancers can serve L2 students in the pre-, during, or post-writing stages for various pedagogical purposes. Compared with its many documented applications, corpus consultation at the drafting stage of written texts is much less explored in various educational contexts, and research is even more limited for English-as-a-second/foreign-language learners (EFL). To bridge this research gap, the current action research study aims to investigate how FL learners can apply DDL to discover vocabulary for drafting their writing. The project analyzed the corpus consultation undertaken by three groups of undergraduate EFL students (freshmen and sophomores) for applying the vocabulary item they looked up into their drafts while writing. In this chapter, we hope to add to the literature on the use of DDL in English drafting.

LITERATURE REVIEW

Before we touch upon more relevant studies on using DDL for drafting, a brief discussion on DDL for vocabulary learning is provided as vocabulary is fundamental to the development of English writing. Lee, Warschauer, and Lee (2019) examined 29 studies on applying DDL for second language (L2) vocabulary learning via a meta-analysis. They found DDL can promote in-depth vocabulary knowledge and argue for the role DDL can play in facilitating a learner discovery approach to vocabulary knowledge. The academic community has yet to come to a consensus as to whether DDL belongs to explicit teaching or incidental learning. Laufer and Hulstijn's (2001) involvement load hypothesis may help explain how DDL works for essay-drafting from a theoretical perspective. In this hypothesis, a three-component motivational-cognitive construct for incidental second language (L2) vocabulary learning is established: need, search, and evaluation. The need component refers to the motivational, noncognitive dimension with moderate or strong need in terms of the extrinsic-intrinsic distinction. Search refers to "the attempt to find the meaning of an unknown L2 word for expressing a concept (e.g., trying to find the L2 translation of an L1 word) by consulting a dictionary or another authority (e.g., teacher)" (p. 14). Evaluation implies "a comparison of a given word with other words, a specific meaning of a word with its other meanings, or combining the word with other words in order to assess whether a word (i.e., a form-meaning pair) does or does not fit its context" (p. 14). Search and evaluation are involved when DDL is applied to learn FL vocabulary.

Borrowing Phrases from Corpora to Assist in Language Production

Some scholars believe that the great potential for students to consult corpora is to borrow phrases for written or oral communication. Kennedy and Miceli (2001) described an action research project that documented how eight college learners of Italian used a corpus as a reference resource in their writing. Using a monolingual concordance program, *Contemporary Written Italian Corpus* (CWIC), they found that their students appeared to lack sophisticated search strategies, or had flawed reasoning, as their training had not equipped them as corpus researchers. In their second study, Kennedy and Miceli (2010) described how three participants learned to apply CWIC and bilingual dictionaries as references in writing. They defined pattern hunting and defining as below:

> *The thrust of the apprenticeship is to introduce the students to two key ways of using CWIC to enhance their writing: to enrich the content and language of their text, through what we call pattern-hunting; and to edit their text for lexico-grammatical accuracy, through pattern-defining. Both the pattern-hunting and pattern-defining functions entail exploring the corpus in search of models for word patterns to employ in one's own text (adapted as necessary), but their departure points differ. (Kennedy & Miceli, 2010, p. 31)*

The three students were found to show different consultation styles. Two students emphasized correctness in their written Italian by locating Italian equivalents via pattern-defining but not pattern-hunting. The third student worked on pattern-hunting by discovering new patterns rather than solving predefined problems.

In Kennedy and Miceli (2017), twenty-four students took part in a course and were surveyed about their corpus consultation for writing. Two thirds of the students were found to borrow patterns from concordance lines and apply them into their compositions. Meanwhile, these students confirmed the benefits of chunk-borrowing. Five effective CWIC users were interviewed and reflected an the "observe-and-borrow-chunks" behavior (p. 104). These effective users appreciated the merits of concordancing, and tolerated the uncertainties of working with CWIC. Kennedy and Miceli argue that effective CWIC use could lead to language development because the students borrowed pre-fabricated attested chunks with a lexis-oriented view of the target language, and they observed the concordances with an open mind. In analyzing data, they confessed it was hard to distinguish pattern hunting from pattern defining. To advance this line of inquiry, they suggest future research can apply a bilingual concordancer to investigate how learners use it for pattern hunting, and why such an application does not work with some learners also deserves further examination.

To apply DDL for obtaining expressions for oral communication, Geluso and Yamaguchi (2014) investigated how EFL students could use newly discovered phrases appropriately for oral expression. They found a positive impact of corpus use for improving speaking fluency: the vocabulary items in the corpus appeared to assist learners in increasing knowledge of collocation. Exploring how seven first-year EFL college students in Taiwan used the *Corpus of Contemporary American English* (COCA, Davies, 2008) to discover collocation patterns of synonymous verbs for essay drafting, Wu (in press) examined the learning outcomes, learners' corpus use, and their perceptions of the pattern-hunting process. She collected students' texts composed in three time frames, video files of their corpus consultation, and other data sources. It is found that the learners could successfully discover and incorporate verb collocations into writing, although some difficulties emerged with improved performance over time. She also documented learners' different perceptions and actualizations of the affordances offered by the corpora, and suggested that this line of inquiry can be extended to examine the process of pattern-hunting in a larger or more diverse group of EFL writers. While this EFL study provides an in-depth case-study report, the findings may not generalize to a larger population or learners in other EFL contexts.

Motivation of the Research

Researchers have examined the use of corpora by learners for pattern discovery in L2 writing or speaking for content enrichment. These limited studies on pattern hunting focused on the lexical-grammatical features of queried items such as collocations (Geluso & Yamaguchi, 2014; Wu, in press) or chunk-borrowing (Kennedy & Miceli, 2001, 2010, 2017). In particular, the meager literature on vocabulary learning for draft-writing via DDL shows that much is still unknown concerning how EFL learners locate words for their texts and how the search and evaluation process is conducted. To fill the gap in the literature, this study investigated how corpus consultation can help college students perform "observe-and-borrow-chunks" functions or "pattern-hunting" (Kennedy & Miceli, 2017, p. 91) during corpus use. We investigated how a group of EFL learners applied DDL for drafting and why some EFL students do, or do not embrace corpus consultation (suggested in Kennedy & Miceli, 2017). Use of bilingual corpora in the consultation process warrant further investigation as prior studies used a monolingual Italian (Kennedy & Miceli, 2017), or English concordance program (Wu, in press). Research questions explored in this chapter are as follows:

1. What linguistic features of English vocabulary merited the students' choices in corpus consultation?
2. What was their consultation process?
3. What were their perceptions when they used corpora for drafting?

METHOD

A mixed-methods approach was adopted to address our research questions as both quantitative and qualitative data were collected and analyzed.

Participants

Over two academic years, forty-nine college students (age range 19-22 years old) took part in this action research study. All participants were taking a required English composition course in the same institution in an Asian EFL context (Taiwan). They signed a consent form before participation. English had been a school subject since the subjects were in grade 5 of primary school till the first year in college. As English majors, more other subjects/courses in their university studies were offered via English-medium instruction. Eighteen of all the participants were second-year students, while thirty-one of them were freshmen. To allow more writing practice, all the students were arranged in groups (sections) of around sixteen in number when they took the required writing courses. All the participating students in this study came from three respective sections and were taught by the same instructor using very similar syllabi. Approximately two-fifths of them were male, the remaining were female. Around half of the freshmen (i.e., group F2) were recruited in the second year in order to obtain a more comprehensive perspective.

Table 1. Participant structure

Year of study	Coded in the project	Number of students in the group
Sophomore	S	18
Freshman	F1	15
Freshman	F2	16

Moreover, we could in time incorporate questionnaire and interview data from the lessons we learned in the first year. The participant structure is shown in Table 1.

Teaching and Training of DDL for the Writing Course

Three composition assignments were designed for the groups during their semester-long writing courses held in a computer lab. A writing task was administered as part of the second composition assignment. This was the same for students of the three sections. In the task, the learners were requested to use three corpus tools to assist their drafting in their respective composition courses. The students were trained on how to consult the three concordance programs in their first eight weeks of the semester for essay-writing purposes such as drafting or revision (see Liou, 2019 on the sophomores). The three concordancers (that were the same among the three groups) were COCA (*Corpus of Contemporary American English,* Davies, 2008) (https://corpus.byu.edu/coca/), TANGO, and Totalrecall (both from http://candle.nlplab.cc, Liou et al., 2006). The two tools by Liou et al. included three English-Chinese bilingual corpora: Sinorama, corpus of the Hong Kong legislative council and the corpus of Hong Kong news & laws. Both TOTALrecall and TANGO allow users to choose several corpora for consultation. Among corpus choices, Sinorama, an English-Chinese parallel corpus (1990-2000, current textual version may be referred to at https://www.taiwan-panorama.com/en). COCA was an English-only concordance and was the largest corpus among the three, and was the most applicable when the students could not find concordance lines from the two smaller concordancers. The bilingual concordancers allow users to examine the Chinese meaning of difficult English words. TANGO is designed mainly for consultation of adjective-noun (e.g., *high cost*) and verb-noun collocations (e.g., *affect people*). The verb-noun collocation can be extended to verb-noun-preposition (VNP, e.g., *make prediction about*), and there is the third phrasal option for consultation, verb-preposition-noun (e.g., *lead to prediction*). We anticipated that initiation of using TANGO would allow students to understand that vocabulary learning involves more than mastering single-word items only.

Before the target assignment, the instructor introduced the topic of the essay by discussing relevant articles concerning the theme ("What is a hero?" for the second-year students) or genre (narrative for the freshmen), and taught the learners how to complete the first draft of an essay task with the assistance of corpus consultation.

Instruments

The study collected three types of data from all three groups. We gathered (a) all the students' in-class compositions from one writing task, (b) their written records of corpus use/consultation (student logs), and (c) video recording of the lookup processes of fifteen students. Additionally, for Group F2 (16 first-year students), we gathered (d) their responses to a retrospective after-writing questionnaire (nine items) and (e) after-class interviews with five students as this allowed more in-depth investigation into individual students' DDL perceptions. Based on the instructor's and the researcher's observations in the first eight weeks before they started to draft in the lab, the five students were regarded as effective corpus users. To understand what linguistic features of target vocabulary merited students' choices of corpus consultation, we installed a screen recorder system to log the screen operation of the computer, called *Icecream* (https://icecreamapps.com/Screen-Recorder/). Meanwhile, the students were asked to fill in a written record of corpus consultation (see one sample of a freshman participant's draft and her record of corpus use in Appendix A) while they looked up words or phrases in the concordancers during the writing progress. The record asked the students to document the keyword or phrase they consulted, the concordancer they used, and the pattern they induced from the consultation result. Due to the large volume of data involved, only on the F2 group, we collected responses to a retrospective after-writing questionnaire (see Appendix B) only from the F2 group in order to understand their corpus queries and perceptions. The students could also express their opinions on any difficulties they encountered during corpus use. An interview was carried out to understand opinions regarding corpus use by the five students in the F2 group (see prompt questions in Appendix C).

FINDINGS

Three groups of either college freshmen or sophomores (namely students from Group F1, F2, and S) wrote an essay-draft and looked up words in TANGO, Totalrecall or COCA. They were asked to provide a written record of corpus consultation, which was illustrated with one freshman's essay-draft with integrated words underlined in context (see Appendix A). As shown in Table 2, the total learner corpus composed by the 49 students assisted by DDL was 13126 running words, about 268 words per essay. Learners looked up 177 words for drafting as a whole; the numbers of queries across the three groups ranged from 48 to 66 word entries, ranging from three to four words (3.61) per essay among the 49 students.

The sophomores wrote longer essays (about 294 words/essay on average) than the freshmen groups (252.53 words). Among the three groups, consulted words integrated into student essays ranged from 2.93 to 3.44 words (per essay). On average, for the 49 students about 88.14% of total consulted words were included into their writing (156 out of the 177 consulted words being adopted into writing). Compared with the freshmen groups, sophomores included more consulted words into their own writing (90.48%). Across the three groups, when the two freshman groups' statistics were averaged, the sophomores' performance slightly better in spite of their obvious variations when the three groups were examined respectively and compared.

Out of 49 students, only two did not include any consulted words into their essays, a much higher proportion (96%) than the Italian learners in Kennedy and Mecili' study (2017), where 17 out of 24 students (71%) consulted words and borrowed patterns from the corpora in their compositions. All the consulted key words by the three groups are shown in Appendix D.

To understand the difficulty levels of the words consulted by these participants, we inputted all 177 words they consulted into a computer program *Vocabprofile* for analysis (48 words from the F1 group, 66 from F2, and 63 from S). The *Vocabprofile* analysis was based on the BNC-COCA-25 (*British National Corpus-Corpus of Contemporary American English-25K*, Nation, 2012). Using *Vocabprofile*

Table 2. Basic information of the three groups' compositions and lookups

	F1 (N = 15)	F2 (N = 16)	S (N = 18)	Total of 3 groups/ average	Average of F1 and F2 (freshmen)
Length (total words)/words per student	3805/15 = 253.67	4022/16 = 251.38	5299/18 = 294.39	13126/49 = 267.88	252.53
The number of query items	48	66	63	177/49 = 3.61	57
The number of lookups included in the essay (%)	44 (44/48 = 91.67%)	55 (83.33%)	57 (90.48%)	156/177 = 0.88 (88.14%)	49.5 (87.50%)
Average lookups included in the essays	44/15 = 2.93	3.44	3.17	3.18	3.19

*F1 and F2 refer to the two freshman groups; S refers to the sophomore group.

and BNC-COCA-25, the English vocabulary range in a text can be profiled to show word proportions of 25 difficulty levels where the K1 percentage means the proportion of the most common 1000 words in the text, K2 stands the most common 2000 words, up to K25 (25,000). Table 3 shows the analysis of consulted entries by *Vocabprofile* (http://www.lextutor.ca, Cobb, n.d.) in our study. The query items' degrees of difficulty fell into K1 to K9 word types and off-list words with no occurrence of the K8 words found, nor did words occur between K10 to K25. The result of the analysis shows that most items consulted by the three groups fell in the K1 to K2 levels. The proportions of consulted common 1000 and 2000 words by the freshmen and sophomores were 71.05% vs. 58.73%. This means that most of the 49 students attempted to make sure their word usage of K1 or K2 words were correct for composing sentences in their essay-drafts. The sophomores consulted 41.28% more difficult words under level K3 to K6, compared with what the freshmen queried, 25.44%. However, there was again variation in the results between the three groups (see Table 3 for detail). Overall, all these students did not consult many mid-frequency words (beyond K3) and integrate them into their drafts.

Table 3. Analysis of consulted entries by Vocabprofile

	F1 (n=15)	F2 (n=16)	S (n=18)	Average of (F1 + F2)
Total consulted words	48	66	63	57
K1 words	39.58%	28.79%	36.51%	34.19%
K2 words	35.42%	39.39%	22.22%	37.41%
K3 words	12.50%	22.73%	23.81%	17.62%
K4 words	6.25%	4.55%	7.94%	5.40%
K5 words	2.08%	0	7.94%	1.04%
K6 words	2.08%	0	1.59%	1.04%
K7 words	0	1.52% (*undercover*)	0	0.76%
K9 words	0	1.52% (*brat*)	0	0.76%
Off-list words	2.08% (*birthday*)	1.52% (*freewheel*)	0	1.75%
Total	99.99%	100.02%	100.01%	99.97%

*No incident was found under K8 words

Table 4. Analysis of consulted entries by word categories

	F1 (*N* = 15)	**F2 (*N* = 16)**	**S (*N* = 18)**	**Average of F1 and F2**
Total consulted words	48	66	63	57
Nouns	11/48 = 0.23 22.92%	18/ (27.27%)	24/ (38.00%)	25.09%
Verbs	31/48 = 0.65 64.58%	31 (46.97%)	29 (46.00%)	55.78%
Other categories	6/48 = 0.13 12.5%	17 (25.76%)	10/ (15.87%)	19.13%
Total	100%	100%	99.87%	100%

Table 4 shows the findings based on the analysis of consulted entries by word categories. All three groups consulted verbs the most often among all word categories. The F1 group consulted more verbs (64.58%) than nouns and other lexical categories, whose proportion was also higher than that in F2 (46.97%) and S (46.00%) groups. Among all the three groups, the majority of consulted word categories were nouns and verbs. English verbs are indeed very important (Biber, Johansson, Leech, Conrad, & Finegan, 1999) and may be troublesome for learners so they consulted the corpus tools to find out their precise usage in writing. Syntactic peculiarity and semantic complexity of English words also make verb phrases difficult to learn (Dagut & Laufer, 1985; Hulstijn & Marchena, 1989; Laufer & Eliasson, 1993).

Table 5 shows the proportions of integrated vocabulary entries by single words or phrasal units. All of the three groups applied more single-words (62.33%) in their essays than phrases (37.67%). Chunk-borrowing was regarded as beneficial (Geluso & Yamaguchi 2014; Kennedy & Miceli, 2017) as it aligns with the lexis-oriented view of English. To understand how each participant of the 49 consulted words and applied one word or phrase into their essay, we list such instances for each student in Appendix E. Examples of the phrases which were adopted into the participants' drafts by the three groups are illustrated in Table 6. Patterns of word usage assisted the students to write in a fluent and native-like manner, compared with using single-word entries or deviated forms.

Table 5. Analysis of consulted and included entries by word or phrasal units

	F1 (*N* = 15)	**F2 (*N* = 16)**	**S (*N* = 18)**	**Average of F1 and F2**	**Average of the 3 groups**
Total included words/ total consulted words	44/48 = 0.92 91.67%	83.33%	90.48%	87.5%	88.14%
Single-word	24/44 = 0.55 54.55%	74.55%	57.89%	64.55%	62.33%
Phrasal units	20/44 = 0.45 45.45%	25.45%	42.1%	35.45%	37.67%
Total	100%	100%	99.99%	100%	100%

Table 6. Examples of phrases adopted into drafts by the three groups

F1	F2	S
bulge in, in the corner, dream of, expect for, fill into, hang on, shame on, take out, transfer to, way to	anxious about, born with, catch the bus, complain about, on the contrary, divide into, take initiative, stare at, suffer from, tell about	anonymous hero, boast about, conquer fear, give definition of, difference between, exist in mind, face problems, that is to say, think that, think of

*Headwords are underlined and arranged in alphabetic order

Students' Perceptions

The sixteen students in the F2 group filled in the retrospective after-writing questionnaire (9 items) after they finished their drafts. In response to item 1, more than ninety percent of the students (93.8%) indicated that their awareness of expressions changed after they used the three corpus tools. Besides, most of the students (93.8%) claimed that they could sometimes find the usage of an item or the phrase they needed from the concordancers. Moreover, 31.3% of the group were very positive about locating items they needed through corpus consultation. Half of the F2 students sated that they would keep using the concordancers in English learning or error correction in the future. In item 2, over half of the students (56.3%) responded that they would adjust the part of speech or the tense of the searched word to an appropriate form and then applied it in the context. Fewer students (12.5%) indicated that they attempted to consult words, but the results did not seem useful for their essay. In item 3, over 80% of the students thought that they needed more practice to become familiar with sentence construction, and it might help them to find the patterns of target words if they were trained more frequently in corpus query. In item 4, over eighty percent of the students (87.5%) stated that they practiced corpus use at home before the midterm exam. In addition to drafting compositions, half of the students also stated that they used concordancers in their other English courses (item 5).

In item 6, feedback indicated that over 80% of the students could usually find the results they wanted in the concordancers. However, over 18% of them could not find what they needed. All of the students agreed that corpus consultation was effective and beneficial for their English learning (item 7). However, learner feedback also indicated that there were several disadvantages of concordancing. The students claimed that using concordancers was time-consuming, and they did not feel accustomed to their use. Learners also stated that they were not proficient or could not find the words they needed, or could not apply the item into the essay after they found the consulted examples (item 8). In item 9, over 80% of the students agreed that ever since they started to use corpus tools to learn English, concordancing had changed their learning methods.

Overall, the responses to the questionnaire indicated that the sixteen students in the F2 group mostly felt satisfied with using the corpus tools to help their drafting process, in spite of some difficulties they encountered as a learner.

Pattern-Hunting Processes

Due to time constraints, five students' video files from each of the three groups were randomly chosen for careful viewing (15 files in total sample of 49). The analyses of the fifteen files was triangulated with essays and written records of corpus use, and pattern-hunting behaviors categorized into four categories (after discussion between the two researchers). In the first three categories, the students formed a search query, used the tools, viewed the concordance lines but did not adopt the results or words/phrases into their essays. In the fourth category, they found the results appropriate to their writing and adopted them into their essays. Each of the four categories is illustrated in Table 7. In the first category, the viewing time was short and the student did not stay on nor read the concordances long enough. To illustrate, one student used COCA to check *familiar* and on the screen of the video file we saw only all the left collocates, not the right ones, and the word was not adopted in the writing. In the second category, viewing time of the concordances was longer but we were unsure about the student's query purpose as he consulted *do everything in* or *know direction about/in* by choosing VNP (the verb-noun-preposition phrasal unit) in TANGO (she put down *everything* in the record of corpus use so *everything*, not *direction* was included in our result). None of those expressions was adopted in writing.

In the third category, careful analyses were evident as the student tried to view concordances in every collocation type: VN, VNP (verb-noun-preposition), VPN, and AN (adjective-noun) for the target word *security* using TANGO and the Sinorama English-Chinese corpus. After consideration, she did not adopt the result but kept her original expression of *sense of security* in her essay. In the fourth category, it seemed that the student had a clear goal for searching and viewing, as he used TANGO and chose Sinorama with a target word *suffer*. He searched the collocation type of VNP, read into the results, and decided that *suffer from depression* was a proper choice to fit his intended meaning and the expression was adopted in his essay. Another detailed example for the fourth category is given in Appendix E.

The third and fourth categories can be used as illustrations when teachers train their students to maximize corpus consultation for essay-drafting. Depending on the students' time allocated or their engagement level of the corpus query initiated, one search and consultation incident may include one or several attempts involving one to four categories listed in Table 7 at a time. Other times, participants may simply take the corpus tool as a dictionary, key in a target word, look at the output (for confirmation or superficial viewing), and then decide to adopt it into their drafts right away. This may be most frequent of the query cases since our data indicate over 88% of all consulted words were included into essay-drafts.

Table 7. Four categories of pattern-hunting as lookup processes and outcome

Category	Tool and function or corpora	Target word/phrase	Comments
I. Quick query without enough observation and analysis	COCA	*Familiar*	Quick viewing without the target adopted in writing
II. Query with no clear goal	Tango/Sinorama	*do everything in* or *know direction about/in*	None of the expressions adopted in writing
III. Query for confirmation	Tango/Sinorama, VN, VNP, VPN, and AN examined	*Security*	Careful viewing and consideration but did not adopt any (*sense of security* in writing)
IV. Query for borrowing	Tango/Sinorama, VNP	*Suffer from (depression)*	While viewing concordances, he underlined the three examples under *suffer from* using the mouse pointing. He seemed quite careful in observation and analyses. *suffer from depression* adopted in writing

As for the use of bilingual resources in Totalrecall and TANGO with Sinorama, the aligned parallel corpus assisted the students' comprehension of the English text when difficult words appeared as occasionally some students emphasized the usefulness of TANGO and Sinorama (the English-Chinese corpus). From the 49 incidents in Appendix D and one detailed lookup example in Appendix E, we found these groups indeed maximized the benefit of bilingual resources provided in concordancers, if necessary. In drawing patterns from observing concordance lines, some participants noted down the Chinese meaning of some words in their written records of corpus use (see Appendix D), as the learners' first language scaffolded their EFL learning during the DDL process. However, because of the nature of English drafting, discovering English expressions for communication was their top priority (compared with reading English for comprehension), and thus their major output produced and language of use. A combined use of dictionaries plus concordancers by participant F1-5 (in Appendix D) was noted; this implied a bridge between using old tools (dictionaries) to complement new ones (concordancers); this is perhaps a very useful vocabulary learning strategy in the DDL context.

Five Cases

Based on our observations of the F2 group during the training in corpus use during the first eight weeks of the semester, five participants were chosen to participate in the interview after they finished drafting of their essays as they were recommended by the course instructor as "engaged corpus users." The five students all exhibited careful consultation behaviors as shown in their records of corpus use. We triangulated what they did with corpus consultation and what they said in the interviews as well as how they responded to the questionnaire. All the five participants used corpus consultation to discover or confirm the usage of target words in order to adopt them into their essays. The participants observed the collocation in the example sentence of query items carefully. They compared the usage of target words but may have changed their mind by replacing another word after consultation. The five participants all agreed that the concordancers were effective tools to assist their writing. They were also willing to use COCA, TANGO and Totalrecall continuously in the future, and applied them to other aspects of English learning such as error correction. For tool preference, two of them believed TANGO was a distinct concordance tool, but a female student indicated it was difficult for the students who were not familiar with the part of speech of words using TANGO. COCA, TANGO and Totalrecall were useful for her, but she thought that phrases used in certain internet forums provided by native speakers were much easier to query and more useful for her essay-drafting. None of the participants used concordancers for their English learning before the course, however, after using them, they had a new appreciation of their roles and they confirmed the benefits of applying them for drafting. The five engaged corpus users exhibited good learner behaviors which can be transferred to weak corpus users via teachers' scaffolding.

DISCUSSION

In this study, 49 college students of (freshmen or sophomores) were recruited to consult three corpus tools for drafting an English essay. They consulted about three to four words in their own essays, looked up mostly verbs than words of other categories, and integrated mostly single word units into their drafts (62.33%, phrasal units 37.67%). In our study, we found that over eighty-eight percent of all consulted words (177 in total) were integrated into essay-drafts. We found a much higher proportion of our learners adopted consulted English words into their drafts, compared with the learners in Kennedy and Miceli (2017). While our learners did not integrate as many phrases as single words, the pattern of using chunks started to emerge. The use of patterned language has been linked to L2 processing advantages (Meunier, 2012). We attributed this new awareness of using phrasal patterns to the benefits of orienting our participants into applying DDL for English writing.

We believe that corpus consultation of target vocabulary served for learners as "search" and "evaluation" functions under the three-part Involvement Load Hypothesis (Laufer & Hustijn, 2001) and applying corpus queries for drafting helped the learners to consolidate their productive vocabulary knowledge for drafting. The majority of students did not look up many mid-frequency words (beyond the most common 2,000 words). We found that the sophomores who produced longer essays performed slightly better in using corpus tools for discovering word patterns and adopted those patterns into their draft writing. In spite of idiosyncrasies found in learners' ineffective corpus use for drafting, we found more English learning experiences by the sophomores and deep engagement may compensate for lack of skillful pattern hunting (Yoon, 2016). This finding needs to be interpreted with caution as variation among the three groups were found. Future research can address the proficiency factor with better control than was possible in this research.

Our observations indicated that the students may use new corpus tools in a very similar way to using dictionaries, mostly adopting one word after consultation for usage. However, about 37.67% of consulted words were phrasal units. EFL writing teachers may be happy to see these emergent pattern hunters start to understand phrasal units as these are equally important for composing or drafting as single-word entries. Through using DDL, the emergent pattern hunters started to discover potential phrasal units and then adopted them during English drafting. Among the three corpus tools we integrated into the writing courses, TANGO was the most favored corpus tool for consultation of verb-noun and adjective-noun collocations, again prominent for its chunk-consultation functions with an English-Chinese bilingual corpus. The DDL activity utilized in this drafting project enabled the learners to understand the benefits of consulting TANGO for VN and AN collocations and the importance of integrating phrasal units into their texts. The major advantage of this approach is to increase writing fluency by reducing the processing demands involved in discovering two to several single words in order to combine then into larger units for written expression.

The students, when they were serious about the task and carefully observed the concordance lines, queried words for confirmation (Yoon, 2016), or borrowed unfamiliar words or phrases and incorporating them into their own writing (Kennedy & Miceli, 2010, 2017). This finding was evidenced by adoption of over 80 percent of consulted words into essays. Most learners seemed to use mainly pattern-defining strategies. It is perhaps the case that some of our learners were more goal-oriented, using pattern defining, however, compared with the learners in the study conducted by Kennedy and Miceli (2017) they were not yet proficient enough to undertake pattern-hunting. However, the majority of our learners stayed as emergent pattern hunters during the DDL-aided drafting experience.

Based on their feedback it appears the students believed that corpus consultation could assist them in obtaining new collocations, phrasal and grammatical patterns they did not know before, similar to those reported in prior research (Geluso & Yamaguchi, 2014; Huang, 2014; Kennedy & Miceli, 2010). Thus, they were willing to use corpora in the future. However, some of the participants commented that DDL was time-consuming (Kennedy & Miceli 2017; Wu, in press), and they also did not feel accustomed and proficient enough to use concordancers to discover a wider range of required vocabulary. The participants also indicated they needed more training in corpus use. Scholars repeatedly emphasize that corpus consultation is a lengthy time-consuming process (Dolgova & Mueller, 2019; Kennedy & Miceli, 2017; Troy & Miller, 2019; Wu, in press). EFL or L2 teachers play a crucial role in guiding and facilitating learners in adopting concordancing into their draft-writing and learning processes.

CONCLUSION

In this study, three corpus tools were introduced to 49 EFL college students to assist them in discovering words for drafting. We carefully analyzed 177 words they consulted in terms of their word category, difficulty level, and the proportion of inclusion into their drafts. The sophomores performed slightly better than the freshmen groups. Analyses of their consultation processes show that they looked up words using the tools mainly for pattern defining, and were able to adopt phrasal patterns into their writing. They were at best emergent pattern hunters and had just started to learn to explore alternative words. The questionnaire and interview data in one freshmen group (F2) indicated their favorable opinions about the corpus-aided drafting experience. Most of the students preferred to use TANGO, a bilingual collocation concordancer, as the concordance tool, compared with the other two tools perhaps due to its bilingual corpus and collocation pattern functions.

Leńko-Szymańska and Boulton (2015) state that many English teachers did not equip themselves with enough knowledge or skills to apply corpus-based learning into their classes. However, compared with traditional methods, many teachers also doubted if DDL could assist L2 students' learning of English. After training in corpus use and writing an essay draft, most of the freshmen students thought the corpus tool was effective for them and they would adopt such a tool in English learning in the future. However, lack of enough corpus training was a problem as indicated by some of our students. This finding is echoed by Wu (in press) who notes that mastering corpus consultation for discovering vocabulary in drafting is a long and time-consuming process (Kennedy & Miceli, 2010). Some of our learners succeeded like their five engaged students and their consultation processes were categorized in types three and four, but others did not. Patience and continued guidance from teachers when L2 learners attempt to acquire consultation literacy for drafting appear crucial for final attainment. Devising useful instructional strategies to guide learners to stay open-mined while undertaking concordancing can fully exploit the benefits for draft-writing. Teachers should promote the vital concept of phraseology and encourage learners to learn more items. Pattern inducing via careful observation of contexts of key words, and comparison of the corpus example with the student's own text are two crucial steps in learner training. A certain level of metalinguistic awareness is the pre-requisite for induction and effective learner concordancing in order to achieve positive learning outcomes (Dolgova & Mueller, 2019; Liou, 2019). Finally, learners do not have to understand every long sentence in a corpus but should have proper reasoning for observing left and right collocates of the keyword and have the ability to induce regularities from the observed data as initial consultation literacy.

Some EFL teachers and the students tend to over-emphasize linguistic accuracy in writing classes. Wu (in press) argues that linguistic complexity and content enrichment can be enhanced through pattern hunting acts as illustrated in her case study when DDL comes into play. She maintains that "learners should also be encouraged to actively exploit the potential of induced patterns, because patterns originally used to address errors could further spark the development of ideas." In other words, pattern defining and pattern hunting can actually nurture each other for linguistic development. This claim is also supported by our findings.

We could not analyze all the students' video files; thus, future research can explore information recorded in the video files and triangulate it with various data sources to examine individual differences in depth. Longer-term writing tasks can be designed with close observation of the participants' consultation process in order to yield valuable evidence. Our study is among the first that has examined English L2 learners' applications of DDL for drafting and showed group patterns. The findings contribute to our understanding of how to harness DDL for various writing purposes. Furthermore, they shed new light on consultation processes and outcomes when pattern hunting is utilized for drafting by EFL college students.

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KEY TERMS AND DEFINITIONS

Lexical profile: Lexical profile is a well-known and widely used lexical richness measure. Depending on which computer program the researcher has access to, BNC-COCA 25(Nation, 2012) can divide a text into 25 levels starting from the most common 1000 English words to 25,000 words.

Pattern hunting: (Kenney & Miceli, 2010, 2017): One specific type of application of concordance programs for writing is to explore one or various alternative words for the learner's target vocabulary item in order to achieve the purpose of content enrichment.

APPENDIX A ONE FRESHMAN'S DRAFT AND HER RECORD OF CORPUS USE STUDENT RECORD OF CORPUS USE

Name _____________________; Date: _________
Essay 2: narrative Draft _1_

Table 8.

Keyword/phrase	**Corpus (Tango, totalrecall or COCA), other tool or my own knowledge**	Patterns (key word/phrase from the concordance or induced pattern) **I found; other comments, if necessary**
1. laugh	Tango	Laugh to Laugh at
2. transfer	Tango	Transfer to school 轉學 (Chinese meaning of the phrase)
3. resist on	Totalrecall	Resist on (***on*** is not needed as shown in the concordance line)
4. heard of	Totalrecall	Heard of 聽過 (Chinese meaning)

[Student's composition with a title] Bully (participant F1-3)

I've bullied my classmate in senior high school. Although this thing had passed for a long time, I still couldn't forget what I did. When I was a senior high school student, a new student **transferred to** my class. In the beginning, I didn't hate her and I would help her. My friends very hate her, so I decided to stay away from her. I started to do many bad things to her. For example, my friends and I would chat at the PE class, say the bad words about her and **laugh**. In addition to that, the girl wanted to call my friend so she touched her shoulder. My fiend shouted loudly and said "Don't touch me" to her. Until one day, the girl couldn't resist what we did so talked to my teacher. Because my teacher was angry, she asked us to say sorry to the girl. However, we thought we were right. Finally, the girl transferred to the other school and I never heard of her. For the long time, I met her again in the bookstore and she said, "Hello" to me with smile. Suddenly, I realized what stupid I was before. From then on, I talked myself don't make the same mistakes again. (208 words in total)

APPENDIX B

The Questionnaire

1. When you're writing with COCA, TotalRecall and TANGO as the consulted tools,

Table 9.

Choice	Yes	No	No opinion/ additional comments
(a) Was your awareness of expressions change after you used the three corpus tools?			
(b) Were the concordancers helpful for your draft writing during the class?			
(c) Did you find the English vocabulary or the expression you needed among these three concordancers?			
(d) Will you keep using the concordaners for English learning or writing composition correct in the future?			

2. How did you apply the consulted English word or the expression in essay 2, draft 1? [more than one options are allowed]

Table 10.

Choice	Yes	No	No opinion/ other comments
(a) Copied the consulted words into the essay directly.			
(b) Considered if the concordance result fitted the proper word form in the essay, and revise the part of speech or tense of the target word, if necessary, to make the item more suitable in the essay.			
(c) Applied the consulted words into your essay after consideration.			
(d) Others.			
(e) Inquired but rarely used.			

3. What aspect of the corpus training do you think needs to be improved and reinforced? [more than one options are allowed]

Table 11.

Choice	
(a) Look for the suitable keyword.	
(b) Learn more examples to find the regularity of words.	
(c) Used COCA, Totalrecall and TANGO to understand individual tools' features.	
(d) Others.	

4. Do you apply the words which you consulted at home or computer lab in your essay?
   Yes____ No____ No opinion/additional comments_______
5. Have you ever used concordancers in the other English courses in additional to the writing course?
   Yes____ No____ No opinion_______
6. Do you usually obtain the result you want after concordancing?
   Yes____ No____ No opinion_______
7. Do you think concordancing is effective for English learning?
   Yes____ No____ No opinion_______
8. What is the disadvantage of the corpus assisted writing?(More than one options are allowed)

Table 12.

Choice	Student's opinion
(a) Time-consuming	
(b) Still not used to the tools	
(c) Still not proficient in them	
(d) Need to memorize vocabulary words more	
(e) Could not find the vocabulary needed	
(f) Found the items, but did not apply them in the essay	
(g) Others	e.g., The meaning of the item was sometimes strange when I applied it in the essay.

9. Ever since you started to use corpus tools to consult words to learn English, had concordancing changed your learning methods?

   Yes____ No____ No opinion_______

APPENDIX C

Interview Questions

1. Was it helpful for you to use TANGO/Totalrecall/COCA in drafting your composition? What kind of dictionary or tool did you usually use for query in the past? Among all of the query tools, which was the most useful?
2. After concordancing by TANGO, Totalrecall or COCA and reading the example sentences, did such consultation raise your awareness of word usage or enhance your impression about word usage? Will you continue to use these tools to learn English in the future?
3. When you drafted essay 2 in the computer lab and queried words with COCA, TotalRecall or TANGO, did you find the information you wanted?
4. How did you apply the words, phrases, or usage/patterns you queried into your own draft?

5. Will you use the concordancers to (a) draft your essay, (b) correct errors in essays, or (c) learn other aspects of English (not just in writing) in the future?

APPENDIX D

Table 13. All consulted key words by the three groups

F1 modern advance sit recognize disorder shame way happy birthday fill rest seem bring bulge supply provide reaction reflection complement hide expect lie chore night cruelty yield awake peacefully recall take unforgettable laugh transfer heard resist apply separate accustom dream help betray guarantee response accompany (accompany, repeated by another student) entrust shine hang
F2 share interest regard chat distinguish endure trauma firm aid bus pursue familiar everything embarrass together military embarrass unpleasant complain cruel severe roughly brat keen pour glamorous influence bar professional contrary criticism loneliness perceive frustrate familiar disturb mood negative endure security suffer deliver conduct acquire stare forward anxious born undercover allow initiative divide freewheel get protect set put invasion screw fragmentary annoy permission regret decide want tell
S1 exist concern innovation definition determination face pain choice boast undoubtedly reputation gratitude selfless difference make faith think rare compassion constrain that possess uphold through remind forbid take call sick admire think courage penetrate dedicate situation purpose task brave suffer though term devotion abolish significant mercy inspire courage help conquer quality anonymous accomplish fundamental indispensable virtues suddenly start assist technology conduct lost justice fight

APPENDIX E

Examples of Students' Lookup Operations and Outcomes

(F1 means the first Freshman section, F2, the 2nd freshman section, and S means the sophomore section)

Table 14. Examples of Students' lookup operations and outcomes

N	**Student**	**Searching tool**	**Searching word(s)**	**Excerpt(s) of text found, with searched word(s) and patterns used for borrowing/word sense inferred marked as italicized**	**Used in student's text (mistakes unedited)**
1.	F1-1	Tango	*Hang*	Hang another mirror from the molding on the ceiling.	Moring glories usually can catch my eyes, brilliant purple like a waterfall were hang on a bamboo fence.
2.	F1-2	Tango	*Dream*	She had ever dreamed of to find herself….	When she was sixteen, she dreamed of opening the clothing shop.
3.	F1-3	Tango	*Transfer*	Transfer to school	When I was a senior high school student, a new student transferred to my class.
4.	F1-4	Tango	*corner*	He used to sit in the corner all the time.	The landfill was a square yard located in a corner of our school.
5.	F1-5	Tango + Yahoo	*Bulge*	*Bulge* (v.) 裝滿、凸起 (Chinese meaning equivalent) +with (n.) 【暫時的】上漲(Chinese, meaning "a sudden increase")	Fifteen minutes later, she came back with a bulge in her small purple bag.
6.	F1-6	Tango	*Shame*	It would be an awful shame to see a line that was in service for more than 90 years be torn up.	But for me, the way my brother looking at me was the real punishment, like saying "shame on you."
7.	F1-7	*Tango+own knowledge*	*Way*	Way to…	About this way to celebrating birthday, instead angry, I was happy.
8.	F1-8	*Total recall*	*Fill*	It doesn't take much time to fill them in because they are small and shallow…	Then I quickly wrote down few words that I still remember in the back of the test paper, and filled them into those annoying blanks.
9.	F1-9	*Tango*	*Hide*	No concordance lines listed	One day, I gave an advice to him that playing hide and seek with me.
10.	F1-10	*Total recall*	*Expect*	Expect for 沒做過 (Chinese note) I've been probably everywhere in Taiwan expect for Kinmen.	The night there are extremely quiet, there was endless silence expect for our chatting and gagging sounds.

continued on following page

Table 14. Continued

N	Student	Searching tool	Searching word(s)	Excerpt(s) of text found, with searched word(s) and patterns used for borrowing/word sense inferred marked as italicized	Used in student's text (mistakes unedited)
11.	F1-11	*Did not specify corpus source*	*Relationship*	Have relationship with, Show relationship between, Develop relationship between	Finally, I think the relationship between Restaurant and customer is very important to keep providing with good service.
12.	F1-12	*Total recall*	*Peacefully*	He left this world peacefully	Today, your biggest trouble were fix by me so peacefully to sleep forever, thank you mom.
13.	F1-13	*Tango*	*Take*	They beautician took out some bottles and jars.	Surprisingly, they took out a cake and a guitar and handmade cards in front of me.
14.	F1-14	*Tango*	*Accustom*	Accustom to~~	In their university life, they accustomed to the new circumstance, new friends and classmate.
15.	F1-15	*Total recall*	*Accompany*	Accompanied-accompanied	Fortunately, my friends accompanied with me until my situation getting better.
16.	F2-1	*COCA*	*Unpleasant*	Unpleasant+ about or at	And it turns out that Richard is unpleasant about them.
17.	F2-2	*Total recall*	*Keen*	Usually goes before the word *on*	We brats didn't let that stop us from the concept of carpe diem, we were still keen to go.
18.	F2-3	*Total recall*	*Contrary*	Returning emigrants are not worthy of our sympathy or praise; on the contrary, they should wake up to their own absurdity.	On the contrary, Kobe will always takes part in the competition with his broken finger, broken knee and his broken back and never complain a word.
19.	F2-4	*Total recall*	*Familiar*	Familiar with	This park was a familiar and unfamiliar place to me.
20.	F2-5	*Tango*	*Suffer*	Suffer from depression	It hit my mother a lot, and she has suffered from depression.
21.	F2-6	*COCA*	*Anxious*	Are you anxious about something?	I can feel that my mother was very anxious about me even when I fell asleep.
22.	F2-7	*Total recall*	*Undercover*	Undercover agent	But secretly, he is undercover agent of the government, he has the superpower of his own, who take care of the emergencies that the normal police can't handle.
23.	F2-8	*Tango*	*Bus*	Catch the bus/ catch up with the bus	Thus, I can't do nothing but give up and go downstairs to catch the bus.
24.	F2-9	*Tango*	*Endure*	They have to endure the hardship.	I do feel comfortable when having a nap at any places at will, but I just couldn't endure the boring independent life anymore.
25.	F2-10	*Tango*	*freewheel*	*To move or function freely*	Such as, I am allowed using my 3C products or eating my breakfast in the classes freewheeling although they were not really polite to the professors.
26.	F2-11	*Did not specify source*	*Dilemma*	Face dilemma/ understand dilemma/ avoid dilemma	The story tell us, that it is important to help someone in need with your kind heart. When people felt in dilemma, try to give him or she some useful advice, then next time when you feel down, people will be glad to help you.
27.	F2-12	*Tango*	*Protect*	No concordance lines listed	None of 3 lookups included in his essay
28.	F2-13	*Tango*	*Chat*	No concordance lines listed	I chatted with him by using Line, the day after day.
29.	F2-14	*Tango*	*Tell*	Tell story about…	Nevertheless, I continued to tell something about me to him and he gradually could reply my questions.
30.	F2-15	*Tango*	*Screw*	Screw sth. Up	You always take my things and screw it up '' This is not the first time she did that.
31.	F2-16	*Tango*	*Pursue*	Pursue other interests/ pursue goals	Pursue the Shiny Star In My Heart
32.	S1	*Tango*	*Exist*	Exist in sb. minds.	There are three well known qualities of heroes. Because of these qualities, they can exist in our mind.
33.	S2	*Tango*	*Definition*	Give definition of	Everyone gives different definition of their own true heroes. For me, the heroes drew in my mind must be brave and show the determination others cannot make it.
34.	S3	*Tango*	*Gratitude*	1. Express gratitude 2. Show gratitude 3. Earn gratitude 4. Expect gratitude	If someone want to show gratitude to heroes, they might only say: it's not a big deal, I did what I can do.
35.	S4	*Tango*	*Faith*	Have faith in	And another point is that heroes have faith in themselves, do everything they think right and doesn't afraid to do the wrong things.
36.	S5	*Tango*	*Think*	Thought that	For me, I think that hero is not who own the superpower, but it is someone who helps others people when they are in difficult situation.
37.	S6	*COCA*	*Constrain*	That + constrain/ Constrain 限制條件(Chinese meaning)	Not being constrained by the blind moral creeds.
38.	S7	*Tango*	*Through*	Go~through experience	The things they go through may not be imagined by ordinary people. That is the reason why heroes can stand under the hardship that people cannot afford.
39.	S8	*Tango*	*Take*	Take an example/ take the following example	Take my mom for example, she is the best heroine around the world because she could do anything to make sure whether I was safe and sound.

continued on following page

Table 14. Continued

N	Student	Searching tool	Searching word(s)	Excerpt(s) of text found, with searched word(s) and patterns used for borrowing/word sense inferred marked as italicized	Used in student's text (mistakes unedited)
40.	S9	*Tango*	*Think*	Think of example/ think about something	When it comes to heroes, many people think of superheroes such as batman, spider-man, superman etc. They will have many thoughts of them.
41.	S10	*Totalrecall*	*Change*	Fast~ changing technology	Facing the fast-changing weapons for wars and information technologies, Batman must continuously update his knowledge for knowing how the evil force, which hides behind the bright side, conducts illegal activities.
42.	S11	*Tango*	*Dedicate*	Dedicate himself to/ dedicate themselves to/ dedicate myself to +adj+反身代名詞 (reflexive pronoun)+ to	These are heroic fictional characters who possess supernatural or superhuman powers and who dedicate themselves to fighting crime and protecting the world from all kinds of harm.
43.	S12	*Tango*	*Task*	Perform task/ complete task/ do task/ under task	-
44.	S13	*COCA*	*Term*	Have long term benefit to	Although he is one of the richest man in the world, he is willing to put the right resource to the projects which have long term benefits to human in.
45.	S14	*Totalrecall*	*Mercy*	Mercy of adults/ their mercy	This is why those who help the poor always being called heroes because the mercy in their own mind. Moreover, heroes have contributions.
46.	S15	*Tango*	*Courage*	Pluck up courage	In this cartoon, the coward dog, Courage, in order to guardian his grandma, Muriel, he conquers the difficulties and plucks up his courage overcoming the crisis.
47.	S16	*Tango*	*Anonymous*	Anonymous letter/ hero	Like help the old man cross the road or help your neighbors to carry some heavy package. You can be the anonymous hero if you want. Just do it.
48.	S17	*Tango*	*Fundamental*	Expect for some fundamental differences…	Finally, above mentioned are some of the most fundamental qualities of how people define a hero.
49.	S18	*Tango*	*Start*	Start + Ving ~	She started asking me that am I alright, and comforted me with some encouraging words.

APPENDIX F

One Example of the Query Process

The following example is provided below in order to understand the students' lookup process.

Student F1-13

I won't forget my 19-year-old birthday. It was an unforgettable memory. *The best birthday of my life.*

Student F1-13 queried *unforgettable* in TANGO. The video file indicated that F1-13 queried *unforgettable* by choosing text collocation: Sinorama 1990~2000. She knew that *unforgettable* was an adjective, so that she selected AN (Adjective+ Noun collocation) as the target collection type. Only a collocation was found in the concordance, which was *unforgettable experience*. There were four example sentences for the collocation: *an unforgettable experience* (in two sentences), *this unforgettable experience,* and *many unforgettable experiences* (shown below). She read all the instances in the consultation result, and replaced *experience* (her original choice) with *memory* in the essay-draft.

Query: unforgettable

Instance 1: Chang Yu-hui, who is about to go to Boston University to study compositional theory, had an unforgettable experience.

Instance 2: Researching crabs in Taiwan, I have had many unforgettable experiences: being surrounded by a blue army of soldier crabs on a lonely seashore; the sight of a beach dyed red by a horde of millions of feeding ghost crabs; or swathes of fiddler crabs waving their glittering claws in the sunlight. These and many other such sights have left an indelible impression in my mind. Graduated 1990 from National Chunghsing University chemistry department now a doctoral student in the Department of Life Science at National Tsinghua University.

Instance 3: Traveling to Zanzibar was an unforgettable experience. After returning to Taiwan, she spent some time flipping through information on Zheng He's travels across western sea.

Instance 4: This unforgettable experience and the beautiful underwater scenery he saw when swimming were the inspiration for A Distant Homeland.

Chapter 15

Corpus-Informed Pedagogy in a Language Course:

Design, Implementation, and Evaluation

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ABSTRACT

Data-Driven Learning (DDL), or a corpus-based method of language teaching and learning, has been developing rapidly since the turn of the century and has been shown to be effective and efficient. Nevertheless, DDL is still not widely used in regular classrooms for a number of reasons. One of them is that few workable pedagogical frameworks have been suggested for integrating DDL into language courses and curricula. This chapter describes an exemplar of a practical application of such a pedagogical framework to a high-intermediate university-level German as a foreign language course with a significant DDL component. The Design-Based Research approach is used as the main methodological framework. The chapter concludes with a discussion of wider pedagogical implications.

INTRODUCTION

Corpora, or large electronic collections of texts, have been used in language pedagogy since their inception in the 1960s. Corpus-based language learning and teaching methods and the associated research strand dedicated to exploring their effectiveness have also been known as Data-Driven Learning, or DDL, since Johns (1990) adopted this term from computer science. The body of work on DDL has grown exponentially over the last three decades and has by now convincingly shown that this method can be effective for different teaching targets in different teaching contexts. Nevertheless, DDL is still not widely used in regular classrooms for a number of reasons. One of them is that few workable pedagogical frameworks have been suggested for integrating DDL into language courses and curricula. Although many DDL researchers report on studies conducted within the framework of their own courses, it is impossible to provide details of a course design in a typical research article due to length limitations. This chapter aims to fill this gap by providing a report on a practical application of such a pedagogical framework

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to a language course with a significant DDL component. The chapter begins with a background section that presents a brief overview of empirical DDL research, including advantages and disadvantages of different types of corpora and DDL methods, thus explaining the rationale for selecting the DDL resources and the pedagogical approach for the course. Next, the study methodology is described. The Design-Based Research (DBR) approach was selected that has been broadly defined as "an emerging paradigm for the study of learning in context through the systematic design and study of instructional strategies and tools […, which] can help create and extend knowledge about developing, enacting, and sustaining innovative learning environments" (Baumgartner et al., 2003, p. 5). In the present study, this approach has been operationalized following ten steps suggested by Colpaert (2006) for Computer-Assisted Language Learning (CALL) courseware design. The bulk of the chapter presents a report on the design, implementation, and evaluation of a high-intermediate university-level German as a Foreign Language course with a substantial CALL (DDL) component that is mapped back onto these steps. In line with the DBR methodology, the chapter concludes with a reflection on how the affordances of the DDL technology were utilized for its meaningful integration into the focal language course, thus forming the basis for subsequent modifications to improve this specific instructional innovation.

The intended audience of this chapter includes language educators interested in implementing DDL in their courses as well as DDL researchers who plan to conduct classroom DDL research. Although the described course was designed and implemented in a specific language learning setting – teaching German as a foreign language at a US university – the suggested pedagogical framework and course design model are applicable to many different contexts with appropriate modifications.

BACKGROUND

Types of Corpora and Corpus Tools Used in DDL

Corpus-based language teaching, after a few first applications in the 1960s – 1980s, started developing rapidly after Johns (1990) had singled it out as a distinct strand of CALL: Data-Driven Learning (DDL). This development has been accompanied by the exponential growth of DDL empirical research (see Boulton, 2017, for a timeline) that by now has accumulated substantial evidence that corpus-based teaching is effective and, for certain learning targets, more efficient than non-DDL methods (see recent meta-analyses by Boulton & Cobb, 2017; Lee, Warschauer, & Lee, 2018).

Corpora and corpus tools (e.g., concordancers) used in DDL come in different configurations (see Godwin-Jones, 2017, for a recent list of available corpus resources). First, like any CALL technology, they can be dedicated or non-dedicated, i.e. custom-built for language teaching purposes or general-purpose (Colpaert, 2006). Second, either type of technology can be qualified as open-access or non-open-access, i.e. it can be freely and publicly accessed on the Internet or be proprietary and commercial. In practice, most open-access corpora and corpus tools are non-dedicated because they have been designed with research and not teaching purposes in mind. Therefore, although they are "open," they are not necessarily "educational." Dedicated corpora and tools, on the other hand, while being "educational," are rarely "open." The following section considers the effectiveness of DDL applications of different types of corpus resources.

The Effectiveness of DDL With Different Types of Corpora and Tools

The two by far most popular open corpora in DDL are the Corpus of Contemporary American English, or COCA (Davies, 2008) and the British National Corpus, or BNC (BNC Consortium, 2007) – which is not surprising because the overwhelming majority of DDL interventions have been conducted for teaching English (Vyatkina & Boulton, 2017). Substantial parts of both the COCA and the BNC are freely accessible to the public and can be searched with a built-in concordancer and some other tools. Several studies report that learners of English were able to successfully generate concordance lines from these corpora and analyze them, which led to their outperforming learners in a non-DDL group on a posttest after a focused short-term intervention (Daskalovska, 2015; Kilimci, 2017) or improved accuracy and idiomaticity of collocations in their writing over a semester (Chang, 2014; Li, 2017). Learners in these studies were university students in different countries (China, Korea, Macedonia, Turkey) with a high-intermediate to advanced English proficiency, who had studied English for several years before. Even more impressively, Japanese learners of English with low-intermediate proficiency were able to successfully use COCA to improve their writing (Mueller & Jacobsen, 2016) and speaking (Geluso & Yamaguchi, 2014). In contrast, Quinn (2015) found COCA to be extremely difficult for her Japanese intermediate EFL learners, which has led her to switch to a dedicated, non-open-access corpus. These reservations about COCA are shared by Master's students in an EFL teacher education course in Iran: "Most of them appreciated the website for its features; however, they found it too complicated to be used in language classes because of its strict search rules" (Ebrahimi & Faghih, 2016, p. 126). Student teachers in that study had similar opinions about open access corpus tools such as Lextutor (Cobb, n. d.) and AntConc (Anthony, n. d.): they found them somewhat useful for teachers for correcting their students' writing (after a considerable time and effort invested into learning how to use them) but unsuitable for direct use by learners in a classroom. These reservations regarding non-dedicated corpus resources support Godwin-Jones's (2017) observation that "[s]tudents (and teachers) today are used to more attractive and intuitive (and mobile-friendly) interfaces than is normally the case for concordance software" (p. 21).

In light of the abovementioned limitations of non-dedicated software, it is not surprising that considerable efforts in CALL have been devoted to the development of dedicated resources. A number of recent studies attest to the fact that the use of dedicated user-friendly corpus software can lead to significant language learning gains and high learner satisfaction (e.g., Cotos, Link, & Huffman, 2017; Kennedi & Miceli, 2017; Mirzaei, Rahimi Domakani, & Rahimi, 2015). However, such software is rarely open-access. Furthermore, the lifespan of proprietary software can be, regrettably, limited. For example, Rezaee, Marefat, and Saeedakhtar (2015) used a commercial concordancer that they describe as "powerful and user-friendly" in their highly successful DDL course. However, the access to the tool was discontinued in 2016 due to compatibility issues with Windows. Open access corpora and tools, although also subject to this threat, usually are more sustainable as they have more reliable funding sources and large support teams behind them.

This brief overview has demonstrated that different corpus resources have different advantages and disadvantages, which makes it difficult for DDL educators to make the right choice in order to get "maximum return on minimum investment" (Boulton (2011, p. 70). Boulton proposes a few rules of thumb, stating that corpus software should be free and easy to use, and that techniques should be flexible and transferable. While open access corpora fulfill the first condition (they are free), they are not necessarily easy to use, which puts the onus on the teachers to equip their learners with suitable corpus exploration techniques and methods. A closer look at DDL interventions that were successful with non-dedicated open resources provides insight into such teaching methods.

DDL Methods Beneficial for Language Learning

The concept of guidance has been a key aspect of studies that have reported positive learning gains and learners' perceptions (e.g., Frankenberg-Garcia, 2014; Pérez-Paredes, Sánchez-Tornel, Alcaraz Calero, & Aguado Jiménez, 2011; Smart, 2014; Vyatkina, 2016a, 2016b). Teachers in these studies present their learners with a series of corpus tasks that progress from more scaffolded, mediated, and teacher-guided ones to non-mediated and autonomous ones. The level of this guidance varies considerably depending on specific learner populations and learning contexts. For example, Ebrahimi and Faghih (2016) point out that their Master's students in Iran needed much more CALL guidance than Boulton's (2011) Master's students in France due to the difference in their comfort level with technology. Learner motivation, learning styles, and other individual differences have been mentioned as further important factors (Flowerdew, 2015).

Many studies have demonstrated that much attention needs to be paid to DDL task design. For example, Cho (2015) found that conceptual tasks such as comparing close synonyms in corpus data led to higher gains if implemented as collaborative group work, whereas individual consultation was better suited for procedural tasks such as using target items in translation. Bardovi-Harlig, Mossman, and Su (2017) showed that direct searches of the MICASE corpus were conducive to learners' improvement in using pragmatic routines but not speech acts, with the latter task requiring teacher-prepared corpus printouts. Other studies demonstrate that even low-proficiency learners (Wong & Lee, 2016) or young learners (Moon & Oh, 2017) can successfully search corpora and achieve significant learning gains in carefully guided DDL interventions focused on a narrow target structure. Kennedy and Miceli (2017) argue that DDL should not necessarily aim at converting learners into corpus researchers who can derive abstract patterns from empirical corpus examples. Instead, they propose a more modest goal of developing the "observe-and-borrow-chunks mentality" in learners and "encouraging their curiosity about language patterns" (p. 91). Finally, many researchers provide evidence that DDL may be especially beneficial in combination with other teaching methods such as concept-based instruction (Kilimci, 2017) and provision of written corrective feedback (Crosthwaite, 2017; Quinn, 2015), as well as with other CALL resources such as electronic dictionaries (Karras, 2016; Yoon, 2016).

The overall conclusion that can be drawn from the above literature review is that for corpus-based language teaching to be successful, it needs to be grounded in sound language pedagogy principles. Published research has identified teaching methods that can lead to success in DDL with open corpora. While empirical studies, understandably, contain only brief descriptions of implemented corpus activities, several teacher guides have been published to date that provide suggestions on how to conduct DDL activities and incorporate them into language syllabi and curricula (e.g., Bennett, 2010; Friginal, 2018; Poole, 2019; Reppen, 2010; Shaw, 2011; Thurstun & Candlin, 1997). What is still missing in the field is detailed reports on the implementation of DDL courses or courses with substantial DDL components integrated into a coherent pedagogical framework. This chapter aims to address this gap. While empirical results of several DDL teaching interventions conducted by the author have been published elsewhere (Vyatkina, 2013, 2016a, 2016b), this study presents a report on the planning of a DDL-enhanced language course, selection of corpus resources and teaching methods, course implementation, and lessons learned.

THE STUDY

Methodology

This chapter contributes to the theme of this volume by describing and discussing a practical exemplar of a DDL-enhanced course. Design-based research (DBR) has been adopted as the main research methodology, described by Pardo-Ballester and Rodríguez (2009, p. 87) as "an iterative cycle composed of multiple steps such as exploration of the design, enactment of interventions, evaluation and analysis of the outcomes, and redesign." In their introduction to the first collection of articles on DBR in CALL, Rodríguez and Pardo-Ballester (2013) argue that this methodology is eminently suited to CALL explorations due to the field's main focus on emerging technologies and, thus, on the implementation of complex instructional innovation and change. They also note that researchers frequently need to limit their focus in each particular study to certain segments of the complex, longitudinal, and iterative DBR process. In another contribution to that volume, Larsen-Freeman (2013, p. 25) adds that "DBR researchers adopt a retrodictive view, looking for the influence of prior activity on current activity," thus progressively refining instructional innovations in the next iterations of the design and research process. This chapter follows the abovementioned recommendations for DBR in CALL by presenting a detailed report on the design, implementation, and evaluation of a DDL-enhanced language course. The present report is limited to the first iteration of the course. The described course model that incorporated a technological innovation (DDL) is considered a product of the DBR process, while its retrodictive evaluation (Larsen-Freeman, 2013) serves as the basis for the process of course improvement in subsequent iterations, in accordance with the dual product-oriented and process-oriented nature of DBR (Hung, 2013).

It must be noted that, although the term DBR is relatively new to CALL, similar methodologies have been applied in earlier CALL research. One of the first applications was Colpaert's (2006) adaptation of the industrial design ADDIE (analysis, design, development, implementation, evaluation) model to the development of CALL courseware. Colpaert underscores that in educational settings, ADDIE must be "pedagogy-driven": "It starts from a detailed specification of what is needed for language-teaching and -learning purposes in a specific context, defines the most appropriate method, and finally attempts to describe the technological requirements to make it work" (p. 479). Colpaert operationalizes his model in 10 guiding steps:

1. Describe the Learning Environment
    a. Learner Characteristics
    b. Goals
    c. Selecting Appropriate Language Teaching Method
2. Describe the System Requirements for:
    a. Learners
    b. Teachers
    c. Pedagogy
    d. Technology
    e. Content
    f. Other Actors (e.g. Content Providers, Native Speakers, Parents, Training Managers, Software Providers, Policy Makers)

3. Describe the Architecture of the Distributed Learning Environment
4. Apply an Activity Framework
5. Define Linguistic/Didactic Functionalities
6. Define Personas and Their Goals
7. Conceptualize
8. Specify
9. Perform Pre-Use Evaluation
10. Perform Post-Use Evaluation

In this model, most attention is dedicated to the Analysis, Design, and Development stages of ADDIE (steps 1-9), while the Implementation stage is supposed to take place between steps 9 and 10, and the Evaluation stage is distributed between steps 9 (pre-evaluation) and 10 (post-evaluation). Several studies provide successful examples of applying Colpaert's model to the design of both CALL tools and technology-enhanced language courses (Heift, 2010; Schulze & Liebscher, 2010; Wood, 2011). Following suit, the above list serves as a roadmap and template for the report presented in this chapter.

Finally, this chapter follows the guidelines of the *Forum* rubric, recently introduced by one of the leading CALL journals, *Language Learning & Technology.* For this rubric, articles are solicited that "provide in-depth engagement with the intersection of technology and language teaching pedagogy" (Kessler, 2016, p. 192). The four principles are formulated for the *Forum* articles, which are very much in line with the DBR approach:

1. Establish the empirical or conceptual framework for using the targeted technologies;
2. Describe the instructional context, pedagogical objectives, and technological tools;
3. Provide details of how the technology was integrated: which tools or approaches were used, how procedures were implemented, and how assessment or feedback was utilized;
4. Comment on the challenges encountered and on the suggestions for additional integration. (Kessler, 2016, p. 192)

Step 1: Describe the Learning Environment

Learner Characteristics

General: University and Program

The study was implemented in an upper-level German course of a German Studies program at a large public university in the Midwest of the United States. The majority of the students at this university come from the Midwestern region, speak American English as their L1, are ethnically Caucasian, and enter the university after graduating High School at the age of 18, although there also are students who are international and/or do not fit the above description. The level of comfort with technology is on average high, and most courses at this university include significant technology-enhanced components.

Specific: The Course

The researcher taught this semester-long (16 weeks) course, titled Advanced German I. Eleven students enrolled in the course. Participant metadata were collected via a pre-course questionnaire. Their characteristics were representative of the general university and program student body profile described above. The gender distribution was equal (5 males, 6 females), and most students were German majors (6) and minors (4) as well as seniors (6) and juniors (4). The mean age was 21 years (ranging from 18 to 24). All students had English as their L1 and all of them spoke English as their family language, although five students indicated some German heritage. All students but one had visited German-speaking countries, with the length of their stay varying widely from several weeks to three years. The length of their college-level German study ranged between two and six semesters, with five students having also learned it in High School (2-4 years long). All but three students had also studied another L2 (Spanish, French, Latin, Russian, or Croatian) for a duration ranging from three weeks to eight years. The average L2 German proficiency of participants at the beginning of the course was intermediate at the B1 level CEFR (Council of Europe, 2001), as established via an online standardized test.

Goals

Learner Goals

On the pre-course questionnaire, all learners indicated a high level of intrinsic and/or instrumental motivation to study German. The answers to the question “Why are you studying German?” mentioned interest in the German language, history, and culture, German-speaking countries, and languages in general. Furthermore, all students expressed intent to use German after the course for the following purposes: travel and study, internship, or work in German-speaking countries, communication with family and friends, and teaching German.

Pedagogical Goals

At the university level, broad pedagogical goals were formulated in accordance with the institutional strategic plan: to promote active student learning, take advantage of state-of-the-art pedagogical methods and information technology, and enhance students’ higher-level cognitive and analytical skills. At the German Studies program level, the main goal of the course was to advance students’ German language proficiency beyond the intermediate level and to prepare majors for the subsequent capstone course. The main pedagogical goal of the instructor was to address the abovementioned institutional, programmatic, and student goals. Furthermore, the instructor’s overarching goal as a teacher was to instill in students a sense of responsibility, personal autonomy, and critical and creative thinking.

Selecting Appropriate Language Teaching Method

The Literacy, or Multiliteracies (ML), pedagogical approach (Cazden et al., 1996; Kern, 2000; Paesani, Allen, & Dupuy, 2015) aligns itself well with multiple goals described above, especially because this approach has been shown to be conducive to the development of advanced foreign language capacities (Byrnes, 2005). The ML framework has been developed to fill gaps in the Communicative Language Teaching (CLT) approach that is widespread in the US. Most importantly, the ML approach pushes learners to develop their language abilities beyond fluent oral communication about everyday personal matters toward interpretation and production of texts in multiple genres (including secondary, public discourses) and multiple modes (including various technologies) through collaboration, problem solving, and critical reflection (Schicker, 2018). This approach capitalizes on explicit methods of language teaching that include analysis of linguistic resources employed for purposeful textual meaning making. Furthermore, the ML approach is compatible with Guided Induction (GI) – a teaching method (Herron & Tomasello, 1992) frequently employed in DDL, in which learners induce abstract linguistic patterns while analyzing samples of actual language use through partner work and under teacher guidance.

Step 2: Describe the System Requirements

This step is the most elaborate one in Colpaert's (2006) model as it requires separate specifications for various participants and aspects of the process (learner, teacher, pedagogy, technology, content, and other actors) at four levels (general, local, differential, and targeted requirements), as shown in the so-called GLDT grid (see Table 1).

Table 1. GLDT Grid

	General	**Local**	**Differential**	**Targeted**
Learner				
Teacher				
Pedagogy				
Technology				
Content				
Other Actors				

Data Source: Colpaert (2006, p. 484)

In another study, Colpaert (2004, pp. 138-139) has formulated guiding questions for filling out each cell of the above table. These questions are used as subheadings for the following section of this report for clarity.

Learners

G: What Are Generally Accepted Findings and Principles for Learners?

Adult learners in Foreign Language (FL) environments typically have limited naturalistic exposure to the target language but they can acquire it in instructed settings (Ellis & Shintani, 2014; Loewen, 2015). Motivation and individual differences play a big role in FL acquisition, and the method of instruction can enhance or hinder learners' success.

L: What Are Common Characteristics of the Learners in This Particular Design Space?

The learners are young adult university students learning German as a foreign language whose first and dominant language is American English. German Studies is their primary or secondary subject of study. They have had limited experience learning foreign languages and none of them started learning them as young children. They have little exposure to German outside of class but they are motivated to learn the language and plan to use it in the future for personal or professional purposes. Despite years of learning German in instructed settings, students come to their junior and senior year of German Studies still lacking idiomatic vocabulary and advanced grammar appropriate for understanding authentic German texts in public, literary, and academic genres as well as expressing themselves in these genres. They have a high comfort level with technology.

D: Which Distinctions Must Be Made Within This Design Space, or Which Elements Are Subject to Change?

The L2 proficiency level of the students coming to the course can broadly be defined as intermediate (on average, B1 CEFR) but it varies widely from very low to high intermediate. At the beginning of the course, 2 students were at the A2 CEFR level, 4 at the B1, and 3 at the B2 level. Although all of them were interested in German, the level of motivation to perform well in this particular course may have varied. Other inter-individual differences (e.g., language aptitude, learning styles and preferences) were also expected to be large as in any classroom – although they were not measured in this study. Some students had special needs, for which the university provides accommodations (e.g., flexible deadlines and attendance schedules, special exam arrangements, etc.).

T: Which Characteristics Are Amenable to Improvement (e.g., Vocabulary, Topics, Skills)?

All students were expected to broaden and deepen their vocabulary and grammar knowledge that would enable them to understand and produce German texts in public, literary, and academic genres. The course was also aimed at preparing them to write a capstone research paper (a short-term goal) and to provide them with tools and strategies for life-long language learning beyond their university studies (a long-term goal). Due to differences in the L2 proficiency and individual differences (see above), the ideal course design should have allowed all students to improve independently from their starting point and the pace of their progress.

Teachers

G: What Findings and Principles Are Generally Accepted for Teachers?

Typically, advanced language courses for majors and minors at US universities are taught by professorial staff. Professors are highly independent and flexible in syllabus design and material selection. The positive aspects of this are that most professors are motivated to teach effectively and to improve the design of repeatedly taught courses. The negative aspects are that not all professors keep abreast of innovative teaching methods (especially if their research is outside Applied Linguistics) and that they do not have enough time for teaching innovations due to a high research and service workload. Furthermore, this independence frequently leads to a lack of coordination between courses in a program.

L: What Are Common Characteristics of Teachers in the Design Space?

The case course was taught by a teacher-researcher whose main field of inquiry is Instructed Second Language Acquisition, who regularly follows new developments in language pedagogy, and engages in a research-application cycle while testing the effectiveness of new teaching methods, specifically CALL methods. The instructor was thus highly motivated to design this new technology-enhanced course and had the freedom to do so as a member of the professorial staff.

D: Which Distinctions Must Be Made Within This Design Space, or Which Elements Are Subject to Change?

The syllabus was to be prepared in advance of the course, including materials, activities, assignments, and assessments, but the teacher was ready to make changes and adjustments in accordance with the class dynamics and individual student differences.

T: Which Characteristics Are Amenable to Improvement?

While planning the course, the teacher/researcher was going to convert her theoretical knowledge of ISLA and CALL principles (as a researcher) into practical knowledge (as a teacher) by implementing them under specific local conditions, to monitor this implementation, analyze the results, and make improvements for future course iterations as well as to contribute to future theory development.

Pedagogy

G: What Are Generally Accepted Findings and Principles for Learning and Teaching?

It is an established fact that rich exposure to the target language is a necessary condition for successful ISLA (Ellis & Shintani, 2014; Loewen, 2015). However, specific teaching methods can be more or less effective depending on the teaching and learning goals, learner characteristics, and local conditions.

L: Which Learning/Teaching Method Is Currently Being Used Within the Design Space?

The instructor followed an approach that aimed at a balanced development of different language skills (reading, writing, speaking, and listening) and knowledge areas (vocabulary, grammar), incorporated a significant culture component, and included both explicit (e.g., grammar analysis) and implicit (e.g., reading authentic texts) teaching. A considerable portion of class time was devoted to collaborative work in partner groups, while most individual reading, writing, and grammar practice was allocated to homework.

D: Which Distinctions Must Be Made Within This Design Space, or Which Elements Are Subject to Change?

In designing this new course, the teacher/researcher aimed at implementing a more principled ML and GI pedagogy approach while continuing to focus on multiple language teaching targets (listed above).

T: Which Aspects Are Amenable to Improvement?

The students needed more exposure to authentic target language. More effective methods for developing advanced vocabulary and grammar, writing skills, as well as critical thinking, reflection, and analysis activities needed to be incorporated. Students needed to learn strategies and tools that they could use for life-long language learning beyond the classroom. Corpus-based CALL (see next section) was thought to be the necessary technology that could help improve these pedagogical aspects.

Technology

G: What Does a Strength-Weaknesses-Opportunities-Threats (SWOT) Analysis of Technology in Learning Show? What Does a SWOT Evaluation Determine About Existing Comparable Courseware?

A SWOT analysis of corpus-based CALL (DDL) was presented in the literature review at the beginning of this chapter. It can be summarized as follows: *Strengths*: DDL can lead to significant learning gains and high student satisfaction. With sufficient teacher mediation at the beginning, corpora can gradually become a valuable resource for autonomous language learning. Open access corpora are preferable to proprietary corpus software. *Weaknesses*: Open corpora are not (exclusively) dedicated to educational purposes and may be difficult to use for language learners and teachers. *Opportunities*: Pedagogical mediation, guidance, and training can alleviate difficulties connected to (initial) corpus use. Corpora can be especially useful in combination with other CALL resources and other teaching methods. Corpora can provide flexibility for learners to study at their own pace and time. *Threats:* If not tailored to local conditions and goals and not based on sound pedagogy, corpus use may be detrimental to learner success and lead to teacher and learner frustration.

A SWOT analysis of comparable CALL – e.g., dedicated corpora and corpus tools – shows that they may have some advantages (being more tailored to teacher and learner needs, having a friendly user interface). However, if the ultimate goal is to prepare learners to language use outside the classroom and life-long learning, the ecological validity of open corpora outweighs their disadvantages.

L: What Infrastructure and Equipment Are Available in the Design Space? What Courseware Has Been Used Before?

The university is well equipped with educational technology, fast internet connection, and tech support. All classrooms are equipped with computer stations and large projection screens, and instructors can also reserve computer labs with computer stations for each student or check out laptops or tablets for regular classrooms. Almost all students feel comfortable using technology and possess multiple electronic devices. Most university courses utilize an electronic course management system (*Blackboard*) that is mandatory for all students as well as multiple technology-based assignments and assessments. All of the above applies to the courses in the focal program. Examples of courseware that are used include electronic writing assignment submission, online quizzes, audio and video clips from German media, electronic dictionaries, and more. Furthermore, the teacher/researcher had successfully piloted using the target German corpus in a graduate course (Vyatkina, 2013), also attended by two undergraduate students, which increased her confidence in its suitability for this planned undergraduate course.

D: Which Distinctions Have to Be Made Within the Design Space or What Is Subject to Change (e.g., Operating Systems, Network Types, Processor Type, Software Versions)?

No distinctions were to be made because the corpus software worked well with local infrastructure conditions.

T: Which Aspects Are Amenable to Improvement (e.g., Less Network Traffic, Faster Execution)?

No infrastructure changes were needed.

Content

G: What Content Is Available Worldwide?

In most foreign language classes, the main content is provided through textbooks with a variety of supplementary materials. With the recent exponential growth of CALL resources, the proportion of such resources in comparison with traditional paper-based resources has been growing, too. There are also various German corpora available.

L: What Kind of Content Is Being Used in This Design Space (e.g., Textbook, Syllabus)?

All courses in the focal program use syllabi, textbooks, and a variety of supplementary paper-based and CALL materials as described above. The Digital Dictionary of the German Language (the German acronym DWDS) is one of the largest and best developed and supported open corpora. DWDS was selected for the course based on the instructor's experience with this corpus and promising results of its pilot use in a graduate course (Vyatkina, 2013). DWDS has other important pedagogical advantages such as a user-friendly interface, a wide variety of represented text types (genres), and the availability of multiple integrated and cross-linked corpus tools and associated electronic resources. In fact, it is more than a corpus, being rather a suite of lexicographic electronic resources, including thesauri, timeline graphs, and statistical analysis and visualization tools (see Vyatkina, 2018, for details).

D: Which Distinctions Must Be Made Within This Design Space, or Which Elements Are Subject to Change?

In accordance with the main course goal – development of learners' multiple literacies – the instructor made a decision not to use a traditional textbook. Instead, the required course materials included the syllabus, a reference grammar, a German novel, the DWDS corpus accompanied by printed and electronic assignment guidelines. Additional materials were also used in class such as audio and video clips from German media.

T: Which Aspects Are Amenable to Improvement?

The corpus and the novel were intended to provide students with increased exposure to authentic target language. Furthermore, because the whole text of the novel is integrated in DWDS, it helped contextualize some corpus assignments: the students could read a passage in the book (see Appendix 1) and then focus on specific patterns of language use while working with concordance lines generated from the text of the novel using the corpus interface. To connect the corpus with another course text, a reference grammar was provided and some assignments asked the students to compare grammar rules as formulated in the book and as evidenced in actual usage examples from the corpus. Corpus assignments aimed at the development of vocabulary and grammar knowledge as well as of writing and speaking skills. Beyond purely linguistic goals, corpus assignments targeted the development of critical thinking, reflection, and analysis. Furthermore, the students were explicitly advised to continue using the corpus for consultation and further development of their advanced German capacities after finishing the course and upon graduation.

Other Actors (e.g., Content Providers, Native Speakers, Parents, Training Managers, Software Providers, Policy Makers)

G: What Is Their Generally Accepted Overall Role During Implementation, Use, And Evaluation?

University administrators can support or hinder new course design efforts. They are, in turn, influenced by the general population's demand for language education services as well as policy maker decisions. Software providers are also important actors in the process of designing CALL-enhanced courses.

L: What Is Their Presence and Role in the Design Space?

The institutional administrators were supportive of designing new courses that incorporated technology (see step 1). Moreover, the design of the case course was supported by an internal institutional course redesign grant for introducing Digital Humanities skills, methods, and tools to undergraduate students.

D: Which Types of Actor Can Be Distinguished and Which Actor Characteristics Are Subject to Change?

The position of university administrators and policy makers is subject to change due to various factors. The DWDS corpus has been developed and is being supported and regularly updated by a large team of researchers at the Berlin-Brandenburg Academy of Sciences in Germany. They regularly improve the corpus interface and upgrade its content.

T: What Is Amenable to Improvement (e.g., Teacher Guidance, Parent Control, Mediated Communication with Native Speakers)?

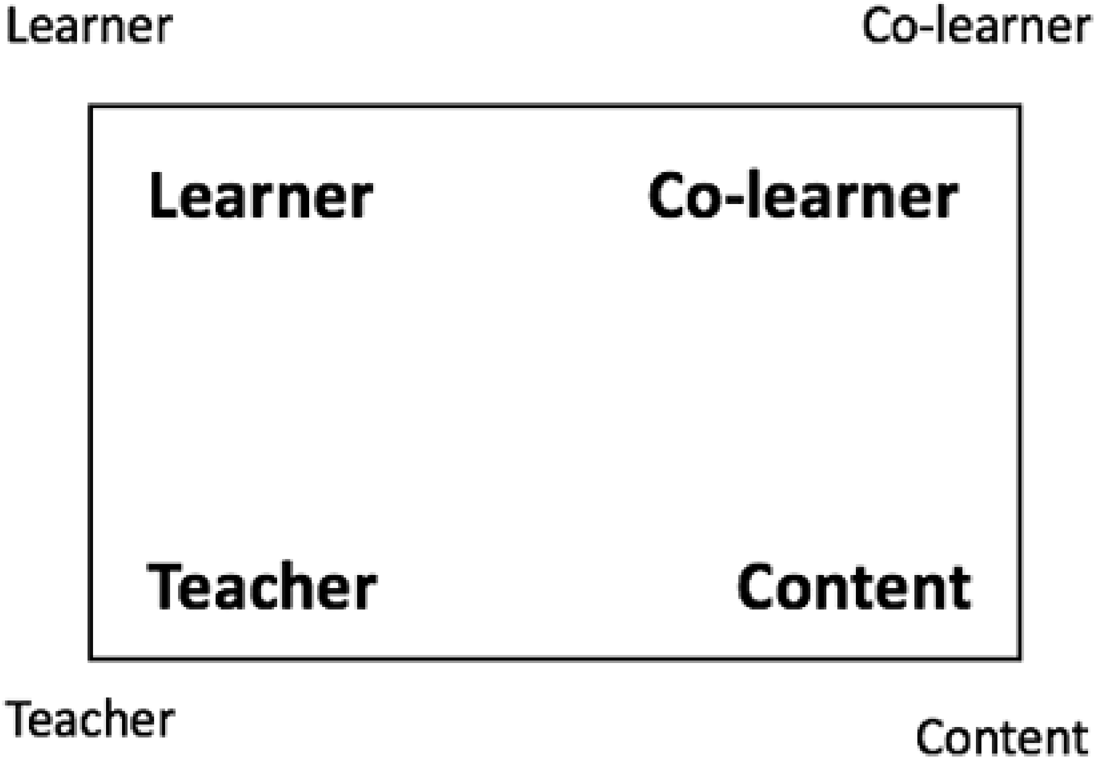
Foreign language advocacy can influence the position of university administrators and policy makers to the benefit of language programs. The instructor's department has been actively engaged in such advocacy efforts. The DWDS support team is very responsive to feedback. They promptly respond to customers' suggestions for improvement and provide helpful explanations when asked clarification questions.

Step 3: Describe the Architecture of the Distributed Learning Environment

Colpaert (2006) describes this step as follows: "Online technologies allow the design of 'distributed' learning environments. The term 'distributed' not only refers to the physical aspect of location (inside or outside the classroom), but also to the distribution of our focus four components: (a) the learner, (b) the teacher, (c) the colearner [sic], and (d) the content. […] These eight possibilities amount to numerous flexible combinations […]. Every combination leads to a new setting which can be appropriate for a specific moment in the learning process or for a specific task" (p. 485). The following combinations were utilized in the case course:

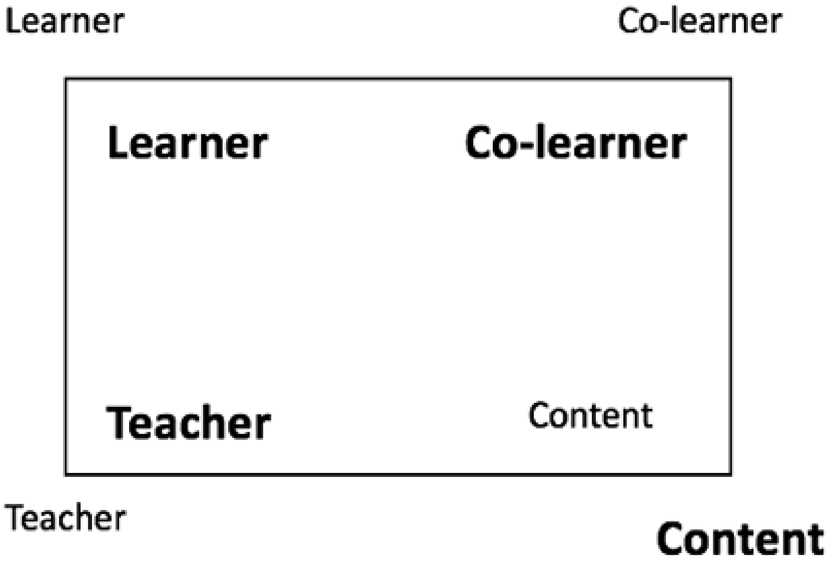
Configuration 1 (Figure 1): All four components were connected in-classroom as in any face-to-face lesson. In this setting, the learners worked with their co-learners with corpus printouts under the teacher's guidance. This configuration was used at the beginning of the course to familiarize the students with the corpus output format as well as later on when the task warranted offline work.

Figure 1. Architecture of the distributed learning environment 1: Traditional classroom; corpus printouts
Modified from Colpaert (2006, p. 485)



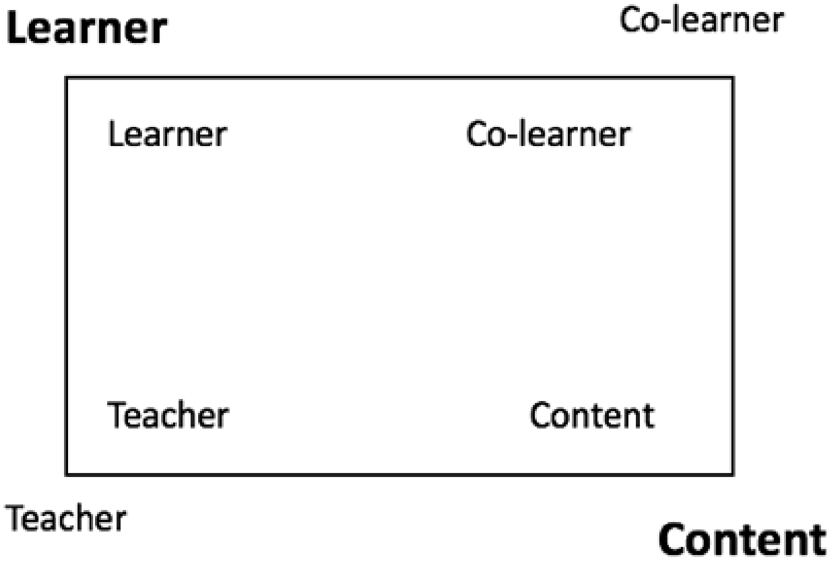
Configuration 2 (Figure 2): The in-classroom learner connected to in-classroom co-learners and in-classroom teacher as well as to remote content. This configuration was used when the teacher demoed direct corpus searches to learners on a big screen as well as when learners completed direct corpus searches in the computer lab in partner work and under teacher's guidance.

Figure 2. Architecture of the distributed learning environment 2: Computer lab; direct corpus searches
Modified from Colpaert (2006, p. 485)



Configuration 3 (Figure 3): The out-of-classroom learner connected to remote content while completing direct corpus search homework assignments.

Figure 3. Architecture of the distributed learning environment 3: At home; direct corpus searches
Modified from Colpaert (2006, p. 485)



Step 4: Apply an Activity Framework

According to Colpaert (2006), the activity framework includes three components - information, interaction, and communication – each of which can be mediated (include a human or technological didactic intervention) or non-mediated (include incidental learning or activities in which the student practices in real situations).

In the target course, information was non-mediated because corpus texts are authentic materials (i.e., they are produced in real-life situations and not for educational purposes). Interaction with content was also non-mediated because the target corpus was not designed for language learning purposes and because the software did not provide learners with feedback or help (in contrast to intelligent CALL tutors, see Heift, 2010). Communication, in contrast, was mediated because learners worked with this authentic content following the teacher's guidelines. Furthermore, each learner engaged in mediated oral communication with both the teacher and co-learners, receiving scaffolding while completing in-classroom corpus tasks. It is worth noting that due to this mixture of mediated and non-mediated aspects of corpus work, both explicit and implicit teaching and learning was expected to occur. Explicit learning occurs when learners achieve learning gains in accordance with the outcomes explicitly aimed at in pedagogical tasks, whereas incidental learning occurs during direct corpus searches when learners make unintended serendipitous discoveries (cf. Bernardini, 2000).

Step 5: Define Linguistic/Didactic Functionalities

Colpaert (2006) explains that dedicated intelligent CALL software may play a range of roles (such as monitor or tutor), whereas non-dedicated systems "never offer appropriate guidance, feedback, tracking, or reporting functionalities" (p. 488). Therefore, corpus software, being non-dedicated, remains only a tool, whereas didactic functionalities and mediation need to be provided by the teacher or materials designer.

Step 6: Define Personas and Their Goals

This step provides a "link between system requirements (analysis) and the concept of the solution (design)" (Colpaert, 2006, p. 489). Personas are "hypothetical users" that the courseware designer has to have in mind as an average course participant. This hypothetical user should represent the intersection between differential learner characteristics (see step 2), and the goals of this hypothetical user should embody a compromise between various learner, teacher, and institutional goals (see step 2). In this course, the hypothetical user was a learner with average characteristics described in 2.1, who was motivated to improve their L2 proficiency with the goal to use German for personal and occupational purposes. Colpaert also suggests using standardized benchmarks and frameworks to specify practical pedagogical goals in this step. In this study, the goal was set to increase learners' average L2 proficiency by half a CEFR level (from B1.1 to B1.2) by the end of the course. In particular, learners were expected to improve their vocabulary, grammar knowledge, and writing ability. Furthermore, they were expected to develop their corpus literacy (as a particular instance of digital literacy, see Mukherjee, 2006) and to learn how to use corpus resources for autonomous language learning.

Step 7: Conceptualize

This step “consists of two concurrent and iterative activities: concept development and the application of usefulness criteria” (Colpaert, 2006, p. 490). The elaboration of scenarios for how the personas will use the courseware to achieve their goals (see step 6) is central to the concept development. Scenarios then need to be translated into system tasks with an emphasis on the integration of the tools. In the present case, conceptualization can be operationally defined as the course syllabus and the progression of pedagogical activities. These activities were scheduled to progress from more mediated to less mediated (see step 4) and from predominantly in-classroom to varied in-and-out-of-classroom configurations (see step 3). Six computer lab class meetings were scheduled throughout the semester at two-week intervals with 60 minutes lab time dedicated to corpus-based activities.

Next, the developed concept has to be checked against four usefulness criteria: usability, usage, user satisfaction, and didactic efficiency (Colpaert, 2006, p. 491). The usability of the selected suite of corpus resources (DWDS) was evaluated as high due to its free and open nature, i.e. its availability to all targeted users. Colpaert’s usage criterion also checked out because the possible usage modes corresponded to the intended use: DWDS is easily accessible on and off campus and on any electronic devices (computer, tablet, mobile phone). Moreover, DWDS was expected to satisfy the intended user because the software is reliable (few connectivity issues, high speed connection), the interface is user-friendly, and the content is appropriate (see step 2). Due to these features, the users could continue using the software long-term, beyond the course time boundaries. Finally, the didactic efficiency was expected to be high based on a good learner, teacher, and teaching method fit (see step 2).

Step 8: Specify

In this study, the concept outlined in the syllabus (see step 7) was specified in lesson plans and worksheets, each including detailed guidelines for students for what corpus tools to use and what tasks to complete. The tasks were designed according to three main learning environment configurations (see step 3): as in-class partner work, in-class individual work, and out-of-class individual work. Some assignments included indirect DDL activities with corpus printouts, while others included direct corpus searches in a computer lab. While in class, students were asked to work on corpus tasks individually but also to consult with their partners and to ask the teacher any questions that might arise. They were allowed to finish each corpus task at home if they ran out of time in class. They then brought the completed worksheets to the next class and shared the results with co-learners. The learning targets included word profiles (grammatical information, collocations, changes in word frequency over time, Appendix 1), grammatical and stylistic error correction and prevention (Appendix 2), idiomatic expressions (Appendix 3), and more. The capstone DDL assignment of the course was using the corpus for consultation during learners’ work on their out-of-class final paper: an analysis of the course novel. Students were instructed to submit a 1-2 page-long reflective log about how they used DWDS (in English) in addition to this final paper (in German). Sample worksheets are included in Appendices, and more assignment descriptions can be found elsewhere (see Vyatkina, 2018 and 2020, for examples and references).

Step 9: Perform Pre-Use Evaluation

In this step, teachers evaluate the blueprint developed by the researcher as outlined in the previous steps (Colpaert, 2006, p. 493). The teacher in this study was also the course developer and the researcher. Therefore, this step was modified as pre-use data collection to obtain a baseline for future post-use evaluation (see step 10 below). Colpaert relies on Hubbard's (2003) study for specifying the evaluation steps of his model. Hubbard had surveyed 120 specialists from around the world asking them to list most pressing issues in CALL and then classified their responses into four categories that emerged in the data:

1) Effectiveness Issues: the relation between technology use and learning gains
2) Learner-Centered Issues: learner attitudes toward technology
3) Design-Centered Issues: issues of CALL course, software, or activity design
4) Research-Centered Issues: aspects and directions of CALL research.

In this study, the last category was not singled out since all evaluation issues were considered research-centered (in line with the DBR method). Only a brief summary of the data is presented here (see Vyatkina, 2016b, for a detailed description of the quantitative study and results).

Effectiveness Issues

These were explored in a quantitative study of student learning outcomes in their overall L2 German proficiency (measured with a standardized online test) as well as their knowledge of one specific lexico-grammatical target – verb-preposition collocations (measured with a written production test). The pre-use data showed that the overall L2 proficiency of the learners was, on average, at the B1.1 CEFR level. Regarding the specific target, the learners knew only about 35% of the target verb-preposition collocations despite explicit teaching of these forms in previous years as well as immediate prior exposure in the text of the course novel.

Learner-Centered Issues

These were explored through questionnaires. The pre-use data showed that learners had a very high intrinsic as well as instrumental motivation for learning German; no prior familiarity with corpora; and fairly high expectations for using corpora for language learning.

Design-Centered Issues

These were operationally defined as the pedagogical goals described in step 1. The overarching goal was for the students to improve their German proficiency and their corpus literacy, as well as their critical and creative thinking and learner autonomy.

Step 10: Perform Post-Use Evaluation

Post-use evaluation should be performed to ascertain whether the goals set for using the courseware were met. This step includes evaluation of the improvement on all issues evaluated at the pre-use stage (step 9). Only a brief summary of the findings is presented here (see Vyatkina, 2016b, for detailed results).

Effectiveness Issues

Post-use results showed that students improved their overall German proficiency by half a CEFR level, namely from B1.1 to B1.2 (with 3 students reaching the B2 level and only one remaining at the A2 level). The results also showed significant gains in the accuracy of controlled productive use of the target verb-preposition collocations immediately after DDL instruction and also retention of some of these gains a month later. More specifically, learners knew about 70% of the target forms on the immediate posttest and about 45% of the forms on the delayed post-test. Furthermore, all learners improved: those with lower and higher overall proficiency as well as those with lower and higher DDL receptivity.

Learner-Centered Issues

These were explored through analysis of learner questionnaire and reflective log responses. The questionnaire responses showed that students had a very positive experience with corpus activities. On average, they rated their satisfaction at about 4 on a 5-point-scale, showing that they found DWDS activities interesting, useful, and easy to use for language learning purposes. Moreover, these post-course ratings were on average higher than those in the pre-course questionnaire that measured students' expectations. Prose comments from reflective logs matched these numerical ratings, as can be seen from the following excerpts:

- . . . dwds.de was great because it filled in for me everything that a dictionary can't.
- . . . a corpus such as DWDS is extremely useful. Its particular insight into usage trends and stylistic norms allow an insight into the writing of native speakers that dictionaries and grammar guides simply cannot.
- It would certainly be to my benefit to spend further effort in figuring out the ways in which the German language defines itself. I believe that this would clear up quite a few usage issues as well, especially where one-to-one translations of words or phrases simply do not exist. Further, I expect to continue using corpora such as DWDS, in conjunction with dictionaries and grammar references, as the tools with which I self-correct my writing.

In summary, these positive comments showed the students' appreciation of the DWDS suite of resources which they call "extremely useful," "enormously useful," and even "the most important thing" they learned about in the course. Further important comments were those showing that students came to understand the difference between dictionaries and grammars (that provide prescriptive rules) and corpus-based resources (that provide insight into actual usage patterns). Finally, most of them expressed the intent of using DWDS in the future. Encouragingly, at least five participants have started implementing this plan: after the next course (with no explicit focus on corpora) they took with the researcher, they reported having used DWDS independently for consultation throughout the course.

The noted difficulties included some uncertainty about how to use the corpus independently (one student) as well as a difficulty resulting from insufficient L2 proficiency (one student). However, even the least proficient student indicated that he very much liked using DWDS. This fact shows that learning about DWDS was still useful as this student may return to this resource in the future if his L2 proficiency develops.

Design-Centered Issues

These were explored through mapping the course outcomes back onto the pedagogical goals described in step 1. It can be concluded that these goals were successfully realized: students improved their German proficiency and their corpus literacy. Their ability to use open access corpus resources for exploring the nuances of the German language also contributed to the development of their critical and creative thinking and personal autonomy. This evaluation led to the researcher's decision to continue using DWDS in future iterations of the course. After this first iteration of the course, the course was taught three more times with slight modifications implemented based on each iterative post-use evaluation. For example, even more guidance was incorporated into instructions and scaffolding to assist students with lower proficiency and some specific linguistic foci have changed.

SOLUTIONS AND RECOMMENDATIONS

This report on the design, implementation, and evaluation of a DDL-enhanced course contributes to the small but growing body of DBR studies in CALL. It explored how a technological and pedagogical innovation was implemented to suit the specific institutional and instructional context of the study. In order to "provide in-depth engagement with the intersection of technology and language teaching pedagogy" (Kessler, 2016, p. 192), a conceptual framework for using the targeted technologies was established; the instructional context, pedagogical objectives, and technological tools were described; and details of how technology was integrated were provided. Following the DBR approach, this study examined "multiple variables in order to develop a qualitative account that links different instructional conditions with different effects on learning, all the while acknowledging the uniqueness of individual learners and of contexts" (Larsen-Freeman, 2013, p. 23). By mapping the course on a set of carefully defined design specifications (Colpaert, 2006), it has shown how DDL components can be successfully integrated into a language course. Overall, the course was successful as the pedagogical goals set for the course were realized. These positive outcomes support findings from previous research that DDL with open corpus resources leads to learning gains and is positively received by learners (e.g., Bardovi-Harlig et al., 2017; Boulton, 2011; Chang, 2014; Daskalovska, 2015; Kilimci, 2017; Li, 2017). Furthermore, the learners developed their corpus literacy (Mukherjee, 2006) and some of them continued using the corpus autonomously after the course.

Methodologically, the chapter also shows that a pedagogy-driven design model as specified by Colpaert (2006) is a viable approach to designing and implementing CALL courses, thus corroborating Schulze and Liebscher's (2010) study. The present project's success can be attributed to the fact that the course was carefully conceptualized, adequately tailored to the target learner population and learning context, and implemented using appropriate teaching methods, technology (open access corpus resources), and content. As Colpaert (2006) notes, filling the ADDIE template with specific design details "is a challenging, thought provoking, and revealing activity" (p. 484). It is, however, also rewarding: if technology is used in a judicious and theoretically grounded way, it may benefit language learners by helping them achieve various learning goals from specific aspects of L2 knowledge to developing their overall L2 proficiency to general analytical skills and learning autonomy.

From the DBR perspective, the main outcome of the study is both "a methodological framework and a mediational artifact" (Hung, 2013, p. 77) that combines product- and process-oriented aspects. This successful model of a DDL-enhanced course (product) was used by the author herself and can be used by language educators as a basis for developing new courses and improving existing courses with DDL components (process). More broadly, it is hoped that the study will serve yet another important DBR goal – teacher professional development, since only a deep understanding of pedagogy, technology, and their interaction by teachers can lead to a successful implementation of instructional innovations (Rodríguez & Pardo-Ballester, 2013). More DBR studies that focus on DDL coupled with corpus user guides and corpus activities collections designed for and accessible to language teachers can go a long way toward achieving this goal.

FUTURE RESEARCH DIRECTIONS

This chapter contributes to the main theme of this edited volume by exemplifying how DDL, a relatively new technology, can be implemented in a language class following a pedagogy-driven approach. It presented a report on one specific course design experience. As such, it proposes a potential model for future replications, although its success cannot be generalized to all possible language teaching settings. This study is conceived of as the first stage in a longitudinal iterative DBR process that can progress through a systematic altering and refining of contextual design aspects (Larsen-Freeman, 2013, p. 27). Future studies should report on other cases of DDL implementation in various contexts, which would collectively lead to generating a robust knowledge base. Furthermore, although the DDL research body is constantly growing (see Boulton & Cobb, 2017; Vyatkina & Boulton, 2017), more empirical studies reporting on DDL processes, perspectives, and outcomes are needed, including DBR studies. Publication of open access materials for DDL as well as studies reporting on the effectiveness of these materials are also needed. Such a project devoted to the development and testing of teaching resources based on the DWDS corpus is currently under way, with new teaching modules being regularly released with free and open access (Vyatkina, 2020).

CONCLUSION

This chapter has described an exemplar of a practical application of a pedagogy-based model to the design, implementation, and evaluation of a high-intermediate university-level German as a Foreign Language course with a significant DDL component. It is hoped that this example will inspire teachers to use DDL in their own classes at the level and to the extent warranted by their own teaching and learning context: from brief single DDL interventions to full-fledged DDL courses and from highly scaffolded activities for beginning and younger students to more complex and autonomous activities for advanced and older students. Furthermore, the ideal development would be engaging these teachers in conducting their own classroom-based studies for the DBR cycle to continue and the collective knowledge base to grow.

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KEY TERMS AND DEFINITIONS

ADDIE: An industrial design model that includes the steps of analysis, design, development, implementation, and evaluation.

Computer-Assisted Language Learning (CALL): The method of teaching and learning languages with the help of electronic tools and media.

Corpus: A large collection of texts selected in a systematic way and stored as an electronic database.

Corpus literacy: A particular aspect of multiliteracies; ability to use corpus resources for autonomous language learning.

Data-Driven Learning (DDL): The method of teaching and learning languages with the help of corpora.

Design-Based Research (DBR): A research method used to study innovative learning environments that involves iterative steps of the exploration of the design, enactment of interventions, evaluation and analysis of the outcomes, and redesign.

Multiliteracies: A pedagogical approach that capitalizes on collaboration, problem solving, and critical reflection and aims at developing learners' cultural, linguistic, communicative, and technological proficiency.

APPENDIX 1

Sample DDL Worksheet: Word Profile

(instructions translated into English)

1. Choose a new noun (unfamiliar to you) from the first chapter of the course novel. Enter this word in the search line on the frontpage of the DWDS corpus (www.dwds.de) and click on the search icon.
2. Write down the grammatical information about your search word (grammatical gender - *der, die, das*, the genitive form, and the plural form):
3. Write down the word definition in German:
4. Scroll down to the word profile (*Wortprofil*) tool (presented as a word cloud). Write down some collocations of your search word, i.e., its most frequent neighbors. These are words that appear in the LARGEST font.
    a. 3-4 nouns:
    b. 3-4 adjectives:
    c. 3-4 verbs:
    d. 3-4 other parts of speech:
5. In the word profile tool, click, in turn, on three words from those you noted above and write down one example sentence with each of them:
    a.
    b.
    c.
6. Bring this worksheet to the next class.

APPENDIX 2

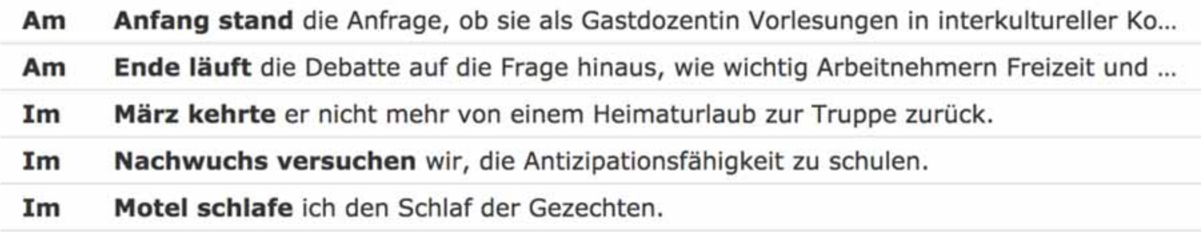
Sample DDL Worksheet: Error Correction and Prevention

(instructions translated into English)

Grammar and spelling. Analyze the **concordances** from the ZEIT corpus (Figures 4, 5, and 6)[1] and decide how you can correct the following erroneous sentences. Rewrite the sentences and explain the rule.

Model

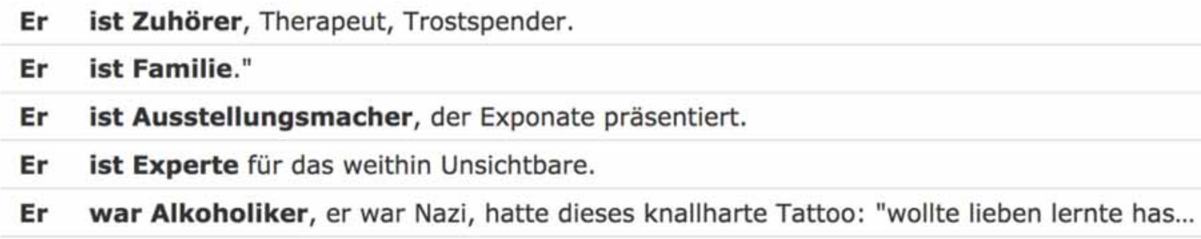
Figure 4. Concordance set 1
Source: DWDS corpus



Am	**Anfang stand** die Anfrage, ob sie als Gastdozentin Vorlesungen in interkultureller Ko...
Am	**Ende läuft** die Debatte auf die Frage hinaus, wie wichtig Arbeitnehmern Freizeit und ...
Im	**März kehrte** er nicht mehr von einem Heimaturlaub zur Truppe zurück.
Im	**Nachwuchs versuchen** wir, die Antizipationsfähigkeit zu schulen.
Im	**Motel schlafe** ich den Schlaf der Gezechten.

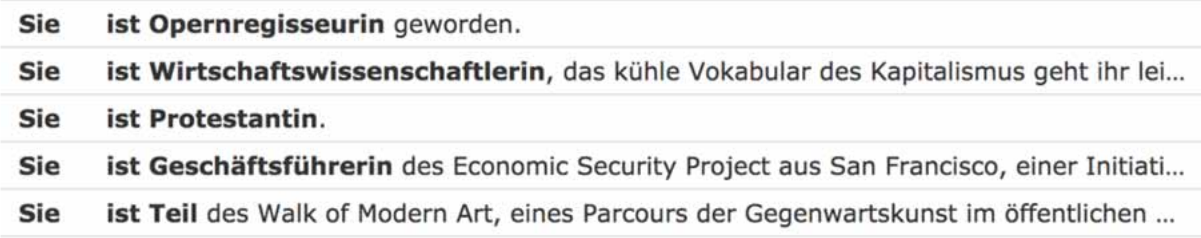
Erroneous sentence: *Am Morgen, ich gehe zur Uni.*
Correction: *Am Morgen gehe ich zur Uni.*
Explanation: In German, the verb always takes the second position in the main clause and there is no comma after the sentence constituent that occupies the first position.

Figure 5. Concordance set 2
Source: DWDS corpus



Er	**ist Zuhörer**, Therapeut, Trostspender.
Er	**ist Familie**."
Er	**ist Ausstellungsmacher**, der Exponate präsentiert.
Er	**ist Experte** für das weithin Unsichtbare.
Er	**war Alkoholiker**, er war Nazi, hatte dieses knallharte Tattoo: "wollte lieben lernte has...

Figure 6. Concordance set 3
Source: DWDS corpus



Sie	**ist Opernregisseurin** geworden.
Sie	**ist Wirtschaftswissenschaftlerin**, das kühle Vokabular des Kapitalismus geht ihr lei...
Sie	**ist Protestantin**.
Sie	**ist Geschäftsführerin** des Economic Security Project aus San Francisco, einer Initiati...
Sie	**ist Teil** des Walk of Modern Art, eines Parcours der Gegenwartskunst im öffentlichen ...

Task

Erroneous sentence: *Er will ein Lehrer sein.*
Correction:
Explanation:

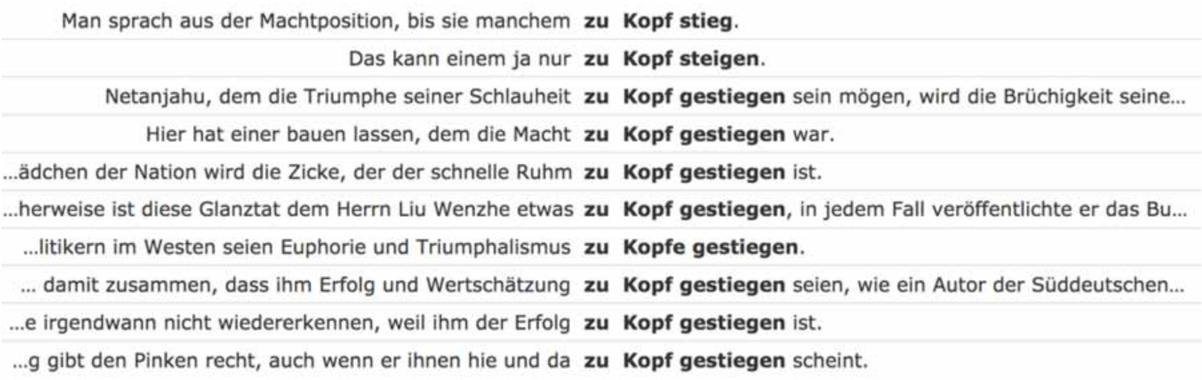
APPENDIX 3

Sample DDL Worksheet: Idiomatic Expressions

(instructions translated into English)

Look at the concordances from the DWDS corpus (Figure 7)[1]. What expression is repeated in each example? Is it repeated verbatim or are there variations? Write down the results of your analysis below.

Figure 7. Concordance set 4
Source: DWDS corpus



Man sprach aus der Machtposition, bis sie manchem	**zu**	**Kopf stieg**.
Das kann einem ja nur	**zu**	**Kopf steigen**.
Netanjahu, dem die Triumphe seiner Schlauheit	**zu**	**Kopf gestiegen** sein mögen, wird die Brüchigkeit seine...
Hier hat einer bauen lassen, dem die Macht	**zu**	**Kopf gestiegen** war.
...ädchen der Nation wird die Zicke, der der schnelle Ruhm	**zu**	**Kopf gestiegen** ist.
...herweise ist diese Glanztat dem Herrn Liu Wenzhe etwas	**zu**	**Kopf gestiegen**, in jedem Fall veröffentlichte er das Bu...
...litikern im Westen seien Euphorie und Triumphalismus	**zu**	**Kopfe gestiegen**.
... damit zusammen, dass ihm Erfolg und Wertschätzung	**zu**	**Kopf gestiegen** seien, wie ein Autor der Süddeutschen...
...e irgendwann nicht wiedererkennen, weil ihm der Erfolg	**zu**	**Kopf gestiegen** ist.
...g gibt den Pinken recht, auch wenn er ihnen hie und da	**zu**	**Kopf gestiegen** scheint.

The expression:
The variations:
The meaning:

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